

Quality of employment, income and poor health: Geographical inequalities in Barcelona

DOUBLE DEGREE

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July 2018

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Abstract

Background. Evidence on health-effects regarding quality of employment is limited because there is no consensus on how to measure it and there is not enough data to represent its territorial distribution. The aim of this study is to provide an approximation through a multi-dimensional approach of the quality of work (employment status, wage, working hours and responsibility) and to represent how it is distributed among the districts of the city of Barcelona.

Method. A cross-sectional sample of 1,739 salaried and independent workers from the Health Survey of Barcelona of 2016 was used. Mental health was assessed using Goldberg 12 items and general health by means of self-perceived health status. Both scales were dichotomized. Hierarchical clustering was applied to obtain clusters of the quality of employment. *Results.* In logistic regressions models adjusting for sex, age and nationality, all the quality of employment clusters were significantly associated with mental and self-related health. The level of the quality of employment is the same as the level of income and health status of those districts that were in the best positions (Sarrià-Sant Gervasi and Les Corts) and in the worst (Nou Barris). *Conclusions.* A strong polarization of quality of employment, economic level and health status is present among the districts of Barcelona.

Key words: quality of employment, health inequalities, multi-dimensional approach, Barcelona.

1. Introduction

Low quality employment not only affects the health of workers, but also families and communities can suffer their consequences (Benach & Muntaner, 2011). Among the different health outcomes, poor mental health is considered the most sensitive outcome to appear (Amable et al., 2001). It is known that people affected by job loss and other detrimental issues related to employment (such as reduction of working hours or changes on responsibility position) show increased levels of depression, self-harm and suicide (Moore et al., 2017).

Health and well-being of employees regarding quality of employment or precariousness had been seldom studied (Vives et al., 2011). However, its recent interest in public health has grown and spearheaded rapidly due to the convergence of three main trends. First, since mid-1970s the employment conditions have changed, leading to an increase of flexible employment (Benach et al., 2000), high levels of job insecurity, and an overall worsening of working conditions (Quinlan et al., 2001). These trends have become more pronounced in the new century. Second, the resurgence of interest on the social determinants of health and especially the focus on employment conditions highlights the weight of precarious employment as a social determinant of health (Benach & Muntaner, 2011). And third, evidence on the relationship between quality of employment and poor health is becoming increasingly apparent due to availability of new data (Benach et al., 2012).

The importance given to the quality of employment in Europe has been reflected by the Lisbon Strategy and the Europe 2020 targets fixed by the European Commission (Van Aerden et al., 2014). As a consequence, many efforts have been made to create a set of indicators to measure job quality. There is no consensus on how to measure it yet (Vandenbrande et al., 2012), although most recent studies point out that the evaluation of quality of employment should be based on multiple dimensions.

So far there are no studies concerning the territorial distribution of employment precariousness (or quality of employment) among regions or within cities, because of the small sample size obtained from the available data (Benach, et al. 2015). Regarding specifically the city of Barcelona, several studies on health inequalities explained by social characteristics (Borrell et al., 1997 & Borrell et al., 2000), socioeconomic factors (Cano-Serral et al., 2006) and urban renewal (Mehdipanah et al., 2014) can be found. But none of them about health inequality due to quality of employment.

In the last few years, the Barcelona Public Health Agency (ASPB) has pointed out how the economic crisis of 2008 has led to more psychological problems, especially due to job losses, precariousness and a negative outlook regarding the future. As a result of the financial crisis, job market has been polarised and consequently, certain groups of people and areas of Barcelona have faced its consequences (Gabinet Tècnic de Programació, 2015).

Despite the improvement of the number of people signing new contracts in the city, especially in the service sector, the predominance of temporary contracts, the quality of employment, and the persistence of the gender gap continue to be a key issue in Barcelona (Cortès-Franch & Artazcoz, 2017). The city shows income inequalities among the different districts. However, according to the report on the territorial of disposable family income (2014), a recovery was

noted in the 2014 financial year, after the hardest years of the crisis that lead to the population towards lower levels of income (Gabinet Tècnic de Programació, 2015).

The interest of this research lies on the development of a geographical analysis of the quality of employment in the city of Barcelona and its relationship to health and health inequalities. This has not yet been done, although data on temporality, population according their employment relationship, unfavourable security conditions, work environment (dust, smoke, noise...), among other quality of employment variables could be found for the city. In particular, the Health Survey of Barcelona 2016 provides a unique opportunity to study the quality of employment at the districts level.

We hope the results of this study will allow us to answer two main research questions: 1) How quality of employment is territorially distributed among the districts of Barcelona?, and 2) To what extent mental and self-perceived health can be explained by the quality of employment in Barcelona?

2. Background

2.1 *The transformation of the Standard Employment Relationship*

During the following years after the Second World War, employment relationships were directed into a capital-labour agreement which guaranteed stable jobs, rights and protections for workers, leading to a context of economic stability and prosperity (Rubery & Grimshaw, 2003). In addition, the mandatory collective protection guarded workers of being exposed to hazardous job environments and harmful employment conditions (Boyer & Saillard, 2002). During this historical context, the Standard Employment Relationship (SER) characterized by a permanent, full-time contract and with generous job-related benefits was predominant (Hadden, 2007). Nevertheless, this idyllic model was far from being universal because it excluded self-employed contracts and the majority of part-time employees, who where most of them women (Quinlan et al., 2001).

In the last three decades of the twentieth century, several dramatic changes such as the “oil shocks” and a constellation of technological, political and economic factors halted the economic growth leading to a transformation of the relationships between employers and workers (Buechtemann, 1993). In the new context, labour market regulations were loosened, social security benefits were limited, and collective bargaining power was modified favouring the individualization of employment relations. As a consequence, the working-class bargaining power was weakened, giving more strength to business and employer’s positions (Scott, 2004). So, flexibility of the management of labour rights in companies was achieved.

Since 1970s, the generalization of flexible labour markets, the degradation of social protection and the declining power and influence of unions, has given place to new forms of employment conditions (Vosko, 2011). As a result of this shifting scenario, studies begin to focus on the precarious employment consequences.

In his review paper, Benach et al. (2014) found that the increment of mental health problems was associated with unemployment growth, staffs cuts, reduction of salaries and poor working conditions because flexibility and precarious arrangements were accentuated. Moreover, at the individual level, many employees feel insecure about their jobs positions and would accept worse working or employment conditions in order to remain in their jobs (Frasquilho et al., 2015).

In the first decade of the 21st Century, due the international economic crisis of 2008 and the austerity policies that followed, an increase in job instability was observed, especially in the context of liberal Anglo-Saxon, Southern and Eastern European countries (Gallie, 2013). Spain has been one of the countries hardest hit by this last recession. Unemployment rate increased to an historical record and employment became more precarious. Temporary jobs grew rapidly to a 30% of the total salaried employment maximum during the expansive cycle, were quickly destroyed (Benach et al., 2016). This deteriorating labour market affected the mental wellbeing of citizens (Frasquilho et al., 2015 & Moore et al., 2017). It becomes reasonable to expect that this negative consequences have been amplified by recent labour market reforms and austerity policies undertaken by the Spanish government under the aegis of the EU institutions.

Spanish's labour market shows a higher prevalence of precarious employment. A 48% of the salaried workers population hold a precarious job in 2005 and 49% in 2010 (Benach et al., 2016). Unemployment rate and shares of temporary employment are above other European countries, even in periods of growing economic activity and low unemployment (Vives et al., 2011). Focussing on a smaller scale, the most recent data from the Statistical Institute of Catalonia (IDESCAT) show that Catalonia had a share of 25% temporary contracts in 2017. According to the Department of Business and Employment, in Barcelona and for the same year, 84% of the new employment contracts were temporary (IDESCAT). Both for Catalonia and Barcelona, there is no new data at the most current multidimensional level, data just could be found at a one-dimensional level.

2.2 Measuring quality of employment

In the past, several studies on the influence of the quality of employment on health have been based on just one-dimensional measures such as perceptions of job insecurity or temporary contracts (Benach et al., 2016). Sverke et al. (2002) and Ferrie et al. (2008) defended that these dimensions are the most significant associated with poor mental health.

Other researchers argued that one-dimensional approach was insufficient to capture the complexity of the phenomena and developed several multidimensional approaches. The first approach came from Rodgers who clarified whether a particular factor of employment exposes workers to: employment instability, a lack of legal and union protection, and social and economic vulnerability (Rodgers, 1989). Underhill and Quinlan (2011) proposed the Disorganisation and Regulatory failure (PDR) Model with several dimensions that contained indicators such as employment stability, operational hours, wage, training, rights and communication. Another example comes from Vosko (2006), who created a four dimensions model, based on the work of Rodgers (1989): stability, regulatory effectiveness, control on labour process and salary. This model was extended with the incorporation of four new variables by Scott-Marshall and Tompa (2011), who included: work-role status, social support, exposure to physical hazards and training.

A latter approach proposed that the quality of employment is better understood as "employment precariousness", defined as a multi-dimensional construct encompassing the following dimensions of employment: insecurity (temporality), individualized bargaining relations between workers and employers (power), low wages and economic deprivation (income), limited workplace rights and social protection (vulnerability), and powerlessness to exercise legally granted workplace rights (rights) (Vives et al., 2010). Acknowledging that empirical evidence regarding the health consequences of employment conditions is limited due to the absence of a measurement instrument (Vives et al., 2010) and the job characteristics that should be selected (Ahn, 2005), a new measurement tool known as the Employment Precarious Scape (EPRES) was developed –based on this theoretical framework.

Several studies, particularly in Spain and Catalonia, have measured employment precariousness through the EPRES scale and demonstrated its association with poor mental health. Young workers, immigrants, manual workers and women are comparatively more exposed to precarious jobs and consequently are more likely to develop poor mental health (Vives et al. 2011 & Benach et al. 2015). Moreover, Benach, et al. (2016) found a persistence in the

prevalence in precarious employment among salaried workers in Spain between 2005 (48%) and 2010 (49%), in spite of the previous massive destruction of low quality jobs due to impact of the economic crisis.

2.3 Quality of employment and health

The so-called “Standard Employment Relationship” (SER) has been modified and “de-standardised” from the end of the 1970’s onwards (Mückenberger, 1989). This process represents a serious menace to worker’s health, as most of the flexible employment arrangements tend to have worse working conditions (Bradley et al., 2000).

From the literature, several authors represent the concept of quality of employment as job insecurity or fear of job loss. It has been demonstrated that job insecurity leads to adverse effects on physical and psychological health, being the same consequences as during the first year of unemployment (Ferrie, 1999). But this insecurity should be understood as a multi-dimensional construct encompassing: loss of power, reduction of wage, more working hours and downsizing, among others factors (Witte, 1999). Also, structural factors of work organization such as workloads and irregular schedules, contribute to adverse health consequences (Borrell et al., 2004). This large group of factors creates uncertainty (psychosocial stress) about continuity of employment (Scott-Marshcall et al., 2007).

Firstly, starting with wage, some authors point out that the individual income has lower effect on individual’s life satisfaction when other job characteristics are included (Ahn, 2005). However, other authors considered it the most valuable reward (Van Aerden et al., 2014). Having a low monetary reward is considered to impede a socially acceptable standard of living (Rodgers, 1989). Secondly, the amount of time working can produce depression due to the “*longer the overtime hours, the greater the mental stress at work*” (Fujimoto, 2006; pg. 28). Under the SER, workers can stay at their workplace for around 40h (Bosch, 2004); excessive working hours can produce mental and physical health disorders (Fujimoto, 2006). Stress can also reflect losing power relationships between employer and employee, superior and subordinate (Newton & Fineman, 1995). In order to avoid high-pressure work, this relationship should rely on employee autonomy and responsibility instead of on direct control and discipline (Friedman, 1977). Regarding temporary employment, which includes all forms of non-permanent contracts, workers who are involved in these types of contracts perceived lower quality of employment more frequently than permanent workers (Catalano et al., 1986). This situation suggests that psychological ill-health increases with a rising degree of employment instability and that permanent workers are the ones less affected (Artazcoz, 2005). Moreover, a review on evidence on the relationship between temporary employment and health, suggest an association with increased psychiatric morbidity, reduced sickness absence and occupational injuries; and that these relationships were stronger as instability of employment rises (Virtanen et al., 2005).

2.4 Spatial segregation of employment

The socioeconomic and the constructed environment characteristics influence the residential segregation of citizens (Borrell, 2013). The geographical concentration of population with similar living conditions is observed through indicators such as household income, educational level and employment (Kaztman, 1999 & Pellegrino et al., 2002). In all the cities, the distribution of

population reflects the socio-economic position of its inhabitants in space, which is not homogeneous (Bayona & Domingo, 2005).

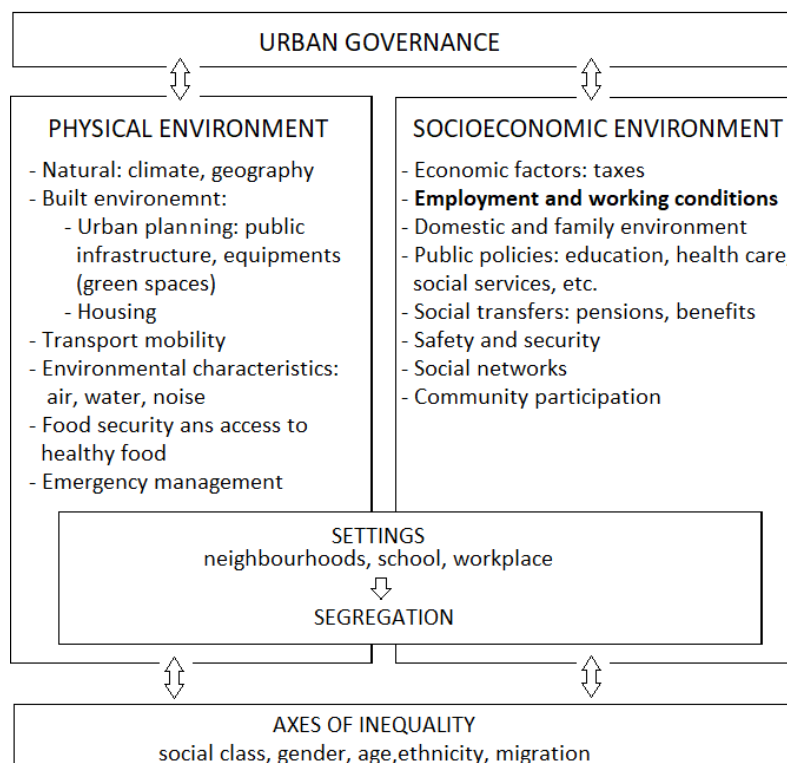
Cities are modelling the territory based on the diversification of occupations belonging to the tertiary sectors. This fact leads to a great contrast, called the *classical dualism*: rich versus poor (Gabinet Tècnic de Programació, 2017). But there is a new form of urban dualism that is characterized by the expansion of the economy which results in a profound fragmented social structure between qualified and unqualified workforce (Gabinet Tècnic de Programació, 2017).

In the labour market, low skilled-workers, from areas with lower socio-economic status, tend to expressed high levels of unemployment, precariousness, instability and low levels of wages. All of this characteristics increase the gap between the most qualified workers, who live in more privileged income areas and the less ones (Kaztman, 2002; Amarante et al., 2004). This situation leads to an increasing concentration of poor workers and their families in neighbourhoods with a high density of poverty (Katman & Retamoso, 2005).

2.5 Conceptual model

Within the framework of “Socioeconomic inequalities in mortality: evidence and policies in cities of Europe project (INEQ-CITIES)”, a helpful tool to evaluate local policies directed to the field of health and to provide estimations of health’s distribution was created. Borrell et al. (2013) elaborated a conceptual framework of the determinants (factors and processes) influencing health inequalities, under the responsibility of the urban governance, and for European urban areas.

Figure 1: Determinants of health inequalities in cities of Europe.

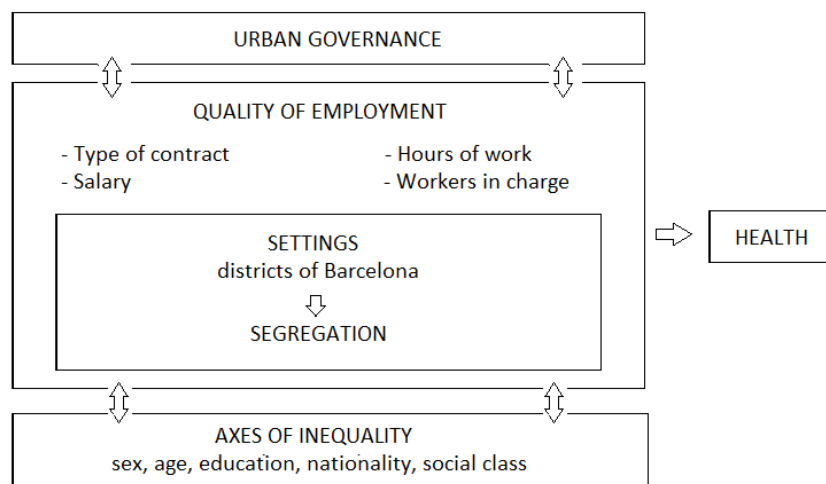


Source: Borrell et al., 2013.

The governance refers to the power of institutions, both public (local, regional and national), private and civil society. From it, the roots of collaborations are tackled between the sectors related with the physical and socioeconomic environments. The physical and the socioeconomic environment refer to factors of state's responsibility, although citizens can modify them. The setting is the place where citizens shape the environment, and also, where they face the problems related with health. Segregation states the separation of the society into groups determined by the different axes of inequality.

Base on this general conceptual framework, a conceptual model for this research has been created just focussing on the dimension of "employment and working conditions". The quality of employment is assessed by four variables and the setting space is centered in the districts of Barcelona.

Figure 2: Conceptual Model base on INEQ-CITIES.



2.6 Employment, mental and self-perceived health in Barcelona.

The city of Barcelona is the capital of the autonomous community of Catalonia and is located on the Mediterranean coast of the Iberian Peninsula. The welfare state of Spain and Catalonia is identified with the model of the countries of central and southern Europe characterized by social benefits, strongly linked to work, and other services funded with general taxes. Spain is responsible for a large part of social spending (pensions and unemployment) and the autonomous administrations are responsible for the universal services of education and health

According to data from the Municipal Register of inhabitants of 2016, the population of Barcelona reached 1,610,427 inhabitants: 762,396 men (47.3%) and 848,031 women (52.7%). Lying on a plane of 102.16 km², the population density was equivalent to 15,763.8 inhabitants/km². The percentage of people aged 15 to 44 years has been reduced year after year, and in 2016 stood at 39.6%. Similarly, the number of people 65 years of age or older compared to those between 15 and 64 years old (dependence index) also grew. All those born outside Spain represent 16.6% of the population of Barcelona, which is equal to 267,790 individuals.

As the register of Catalan Employment Services points out, in the first quarter of 2017 unemployment stood at 12% in Barcelona, below the averages of Catalonia (15.4%) and Spain

(18.9%). However, the situation has been more favourable for men than for women, so gender inequalities have increased (ASPB, 2016). Over a million labour contracts were signed in 2016, but only 13.8% of them were permanent; thus temporary work contracts still predominate (86.2%). Of these temporary contracts, 40.5% had a duration equal to or less than one month, and 57.5% equal to or less than 6 months. The average salaries dropped from 2010 to 2015 by 6.5%, highlighting the situation of the 25% of workers with lower salaries, which still fallen more, an 8.8%. Among the young people, in 2017 unemployment stood at 35.5% being the collective with the higher number of temporary contracts. The fight against unemployment and job insecurity has always been a recurring priority for the City Council. Several employment programmes are in force in order to intensify the labour insertion for people in vulnerable situations, to end the feminization of poverty, to create decent working conditions and to eliminate precariousness for all the sectors.

The mental health problems related to work are mainly anxiety and depressive disorders, most of which affect women (69.7%), and the 17.7% of people with these health problems were born outside Spain, according to the Barcelona Mental Health Plan 2016-2022. Regarding the different occupations, the support professionals and the personnel of services and commerce are the most likely to present these problems in both sexes, followed by the restoration and the cleaning sector.

According to the Health report in Barcelona of 2016, 22.6% of women declare to have a poor self-assessed health status in comparison with the 15.5% of men. In addition, this perception is directly increased by age (ASPB, 2016). Poor self-assessed health goes in accordance with the income level of each area: among women from less favoured social class (SC-V), poor self-assessed health is 41.7%, while among those from the most well-off social class (SC-I) it is 10.6%; among men, these values range from 24.7% (SC-V) to 12.3% (SC-I) (ASPB, 2016).

The 47.9% of the population of Barcelona has a middle income (SC-III: annual average of 19,335€ - Ganivet Tècnic de Programació, 2015), becoming the higher proportion since 2009, when the proportion was 60% (IDESCAT). Nevertheless, its distributions by districts is not homogeneous, but it has a hierarchical stability. According to the City Council distribution of family income available in Barcelona, the ten districts can be grouped into four blocks. The first group is formed by the districts of Sarrià-Sant Gervasi and Les Corts, with a family income of 82% and 36% above the average of the city respectively. In the second group could be found l'Eixample and Gràcia, above and relatively close to the average. The third group is the biggest one, is formed by five districts, ranging from the higher to lowest income, which have an index below the average: Sant Martí-Poble Nou, Ciutat Vella, Horta-Guinardó, Sants-Montjuïc and Sant Andreu. Finally, the district of Nou Barris is alone in the last category because is the one that presents the most distant value to the average of Barcelona (Table 1).

Table 1: Family income per capita, 2016.

Districts	Population 2016	Family income (€/year) 2016	Family income BCN=100*			
			2007	2014	2015	2016
Sarrià-Sant Gervasi	148,172	37,852	178.7	184.3	188.0	182.4
Les Corts	81,708	28,237	138.6	139.7	138.3	136.0
Eixample	264,487	24,767	115.8	115.9	115.8	119.3
Gràcia	120,907	21,875	104.6	108.5	105.8	105.4
Sant Martí-Poble Nou	234,292	18,077	87,7	85,6	86,5	87,1
Ciutat Vella	100,451	18,045	73.5	79.7	85.5	86.9
Horta-Guinardó	167,571	16,436	86.5	77.7	79.6	79.2
Sants-Montjuïc	181,162	16,409	82.5	75.8	78.1	79.1
Sant Andreu	146,706	15,459	84.3	73.0	72.8	74.5
Nou Barris	164,971	11,427	70.8	53.7	53.8	55.0

Source: Statistical Institute of Catalonia, IDESCAT.

* BCN=100 as the average of family income of the city. A value below 100, represents a lower income than the city's average, and above 100, higher.

The report of the territorial distribution of disposable family income, suggests that the difference between the district with the highest income, Sarrià-Sant Gervasi, and the one with the lowest, Nou Barris, has been reduced: it went from 3.5 times more in 2015 to 3.3 times more in 2016, and because of the increase of the gross disposable household income by 3.1% in 2016, it leads to the highest average since 2009 and reducing the gap between the tails (ASPB, 2015).

3. *Objective and hypothesis*

The aim of this study is to contribute with quantitative evidence regarding: 1) the association between the quality of employment and poor health (mental and self-assessed) at an individual level; and 2) to provide an estimate of quality of employment distribution in Barcelona and its relationship with income and health at an aggregate level (districts).

This general objective can be divided into four specific objectives:

- 1.1 Analyse the association between the quality of employment and the health of workers.
- 2.1 Determine the distribution of quality of employment by districts.
- 2.2 Analyse the association between the quality of employment, income average and health.

Based on these objectives, the following hypothesis arise:

- Hypothesis 1: Workers with worse quality of employment will tend to have worse health.
- Hypothesis 2: There will be an association between levels of quality of employment and levels of income at the districts level.
- Hypothesis 3: The higher levels of low quality of employment will be found in the districts with the worse health.

4. Data and methods

4.1 Study population

The population objective of this study is working people between ages 15 and 64 living in the city of Barcelona. Data came from the Health Survey of Barcelona, a cross-sectional general population-based survey carried out by the Public Health Agency of Barcelona in 2016, which ended in March 2017. This survey was based on data on the health of the population, including incapacities and behaviours related to health and on the physical and the socioeconomic context. At baseline, the survey had a sample size of 4,000 men and women. These individuals were randomly selected from the population register, 400 for each district.

The following inclusion criteria were applied for this study: age between 15 and 64 years (working age) and having a paid work during last week at the time of the interview. The following groups were excluded: retired, disability pension and long-term sick leave. The final sample consisted of 1,739 persons, 869 men and 870 women.

4.2 Study variables

4.2.1 Dependent variables

Two variables related to health conditions were used: mental and self-assessed health. Mental health was assessed by the Goldberg scale (*General Health Questionnaire GHQ-12*), which is a psychometric tool to identify common psychiatric conditions. This scale was transformed into a dummy variable: 1 “Poor mental health” and 0 “Good mental health” from 12 questions that are part of the anxiety and depression scale (3 or more positive answers indicating poor mental health).

Self-assessed health was also considered, because it referred to the physical and mental dimensions of health and was classified according to two categories: 0 “Good perceived-health” and 1 “Poor perceived-health”. This classification goes according to five categories variable regarding self-assessed health: excellent, very good, good, regular or bad. Having a regular and/or bad health status is considered as a poor self-assessed health (ASPB).

4.2.2 Employment quality construct

The quality of employment was approximated by the combination of 4 variables based on features of the employment conditions and job characteristics available in the survey. First of all, wage per month (personal monetary reward) was included, ranging from 0 to 6,000€ and transformed into 6 categories: ≤ 600 , 601-900, 901-1,200, 1,201-1,500, 1,501-1,800 and $\geq 1,801$ €. Status in employment was operationalized in 4 categories: permanent contract, temporary contract, self-employed without employees, and self-employed with employees. A variable that included the total amount of hours worked per week was also included and recoded in 4 categories: ≤ 20 h, 21-35h, 36-40h and ≥ 41 h. Finally, to identify the authority and responsibility that each person has in the workplace, a four-categories variable accounting for the number of workers in charge of the respondent was used: none, ≤ 4 , 5-10, and ≥ 11 workers in charge.

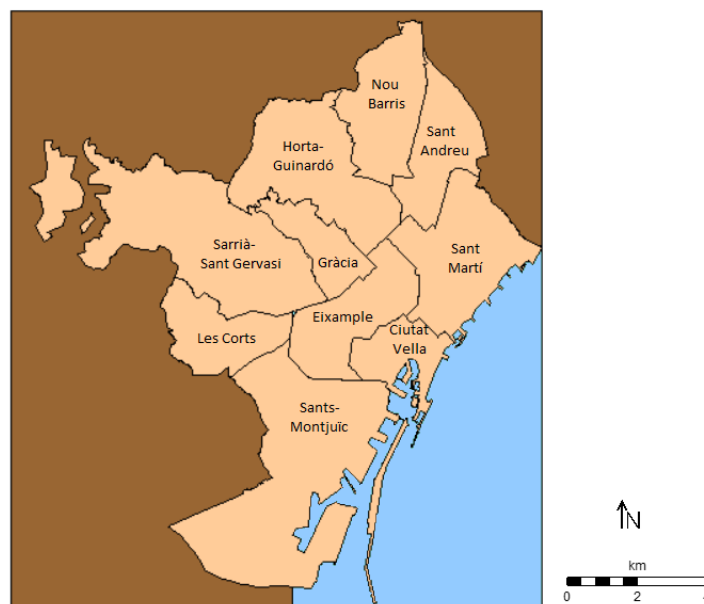
4.2.3 Sociodemographic characteristics

Some adjusting variables were included in this study to control for the potential impact of social position and demographic characteristics. Demographic variables used were sex, age (grouped in six categories corresponding to the groups: 15-24, 25-34, 35-44, 45-54 and 55-64) and nationality (grouped in 3 categories: Spanish, people with two nationality -Spanish and other- and foreigner). Education attainment was measured in 4 categories of: no studies, primary, secondary and university degree or postgraduate studies. Finally, the occupational social class was operationalized in 5 classes (SC-I: higher managerial and professional, SC-II: lower managerial and professional, SC-III: administrative personnel and supervisors, SC-IV: skilled and semi-skilled manual and SC-V: unskilled manual).

4.2.4 Territorial level

This study has been established within precise limits from a territorial point of view. The area of study is delimited by the city of Barcelona, which is divided into 10 districts since the 1984 when the new territorial division was approved (Plenary Council of 18/01/1984) (Figure 3).

Figure 3: Administrative divisions of districts of Barcelona



4.3 Statistical analysis

Descriptive statistics of the health outcomes as well as the explicative and sociodemographic variables were calculated in order to understand and see how our population was distributed. A Latent Class Cluster Analysis (LCA) was performed using the four variables of quality of employment in order to obtain a quality of work-based typology of workers. Different models were performed increasing the number of clusters and the optimal solution was chosen according to statistical and theoretical criterion. It should be pointed out that the clusters encompassed a sample of 1,234 working people because LCA can only be performed with individuals that do not have missing values in any of the variables.

In order to test the relationship between the quality of employment and poor health several logistic regression models were adjusted for both mental and self-assessed health. The distribution of quality of employment in each district was calculated. A part from the distribution, a predominant cluster was also selected for each district by dividing the proportion of the each cluster for every district by the total proportion of the cluster regarding the total population of Barcelona. To distribute mental and self-assessed health among districts, the aggregate percentage of both poor health of individuals was divided into quartiles with the purpose of assigning different levels of health.

All the descriptive and statistical analysis had been stratified by sex. The statistical significance criterion was at 95% confidence level. Statistical analyses were performed using the STATA15 and R statistical software.

4.4 Mapping

Several maps had been performed with MapViewer7 and R to show the distribution of quality of employment by districts and health. All of them were created by own elaboration through the cartographic bases of CartoBCN facilitated by the City Council of Barcelona.

5. Results

5.1 Descriptive analysis

The characteristics of our sample are described in Table 3. The sample included a total of 1,739 salaried and independent workers, 50% men. The majority of respondents were between 25 and 54 years (81%) and 20% of the sample were foreigners. Concerning educational attainment, half of the population had a university degree. Regarding the social class, 26% of the population were at the highest level of occupational social class, and 24% in the third and 28% in the fourth; just an 11% of the population were in the less privileged level. A 13% of the sample reported poor mental health, however just 10% reported poor self-assessed health. More than half of the sample had a permanent contract (63%), while 17% were self-employers without workers. A 43% of the population had a salary between 901 and 1,500 € and 23% earned more than 1,801€. An 82% of the sample had a full-time contract, and 44% work more than 41 hours per week. Finally, most of the people did not have workers in charge (79%) (Table 3).

Analysing the sample stratified by sex (Table 4), some relevant differences can be appreciated. Women predominate in the category of university degree, surpassing by 10% the men. Men predominated in the SC-IV (33%) and women in the SC-I (27%). Women tended to declare poor health: 15% had poor mental health, in contrast with an 11% of men, and 12% had poor self-assessed health, as opposed to 7% of men. About the employment status, women predominated in permanent and temporary contracts, whereas men predominated in self-employed status. Most of the population works full-time (89% of men and 75% of women), however, just the 6% of men who had a temporary contract did not want it voluntarily, in comparison with the 11% of women. Regarding the power and responsibility at work, men tended to have more people in charge in comparison with women. However, the great differences arrive at the time of analysing the salary and the amount of working hours. Men earned more than women. The 28% of men earned more than 1,801€ per month in comparison with just the 17% of women. Most of the women earned between 901 and 1,200€ (25%). Also, the percentage of people who earned less than 600€ per month was higher for women (14%) than for men (6%). Both sexes predominate in the range between 36 and 40 hours of weekly work, however, 14% of women worked less than 20h (7% of men) and 33% of men worked more than 41h (15% of women).

Table 2: Sample characteristics of workers, Barcelona 2016.

	N	%		N	%
Total	1,739	100	Mental Health		
Sex			Good	1,496	87%
Men	869	50%	Poor	229	13%
Women	870	50%	Self-assessed Health		
Age			Good	1,568	90%
15-24	88	5%	Poor	171	10%
25-34	416	24%	Employment Status		
35-44	553	32%	Permanent	1,082	63%
45-54	441	25%	Temporary	280	16%
55-64	241	14%	Self-empl. without workers	297	17%
Nationality			Self-empl. with workers	69	4%
Spanish	1,256	72%	Salary		
Spanish + other	147	8%	≤600	117	9%
Foreigner	335	19%	601-900	134	11%
Education			901-1,200	291	23%
No studies	14	1%	1,201-1,500	247	20%
Primary	346	20%	1,501-1,800	168	14%
Secondary	508	29%	≥1,801	283	23%
University	867	50%	Contract		
Occupational social class (SC)			Full-time	1,405	82%
SC: I	456	26%	Voluntary part-time	162	9%
SC: II	199	11%	Non-voluntary part-time	152	9%
SC: III	413	24%	Hours Week		
SC: IV	477	28%	≤20h	184	20%
SC: V	189	11%	21-35	261	28%
District			35-40	82	9%
Sarrià-Sant Gervasi	166	10%	≥41	412	44%
Les Corts	173	10%	Workers in Charge		
Eixample	175	10%	No	1,366	79%
Gràcia	195	11%	Yes, ≤4	217	13%
Sant Martí-Poble Nou	164	9%	Yes, 5-10	82	5%
Ciutat Vella	186	11%	Yes, ≥11	64	4%
Horta-Guinardó	161	9%			
Sants-Montjuïc	188	11%			
Sant Andreu	171	10%			
Nou Barris	160	9%			

Table 3: Sample characteristics of workers by sex, Barcelona 2016.

	% men (n = 869)	% women (n = 870)		% men (n = 869)	% women (n = 870)
Total	50%	50%	Mental Health		
Age			Good	89%	85%
15-24	5%	5%	Poor	11%	15%
25-34	24%	24%	Self-assessed Health		
35-44	33%	31%	Good	93%	88%
45-54	24%	27%	Poor	7%	12%
55-64	14%	13%	Employment Status		
Nationality			Permanent	60%	65%
Spanish	74%	71%	Temporary	15%	17%
Spanish + other	7%	9%	Self-empl. without workers	20%	15%
Foreigner	19%	20%	Self-empl. with workers	5%	3%
Education			Salary		
No studies	1%	1%	≤600	6%	14%
Primary	22%	18%	601-900	8%	14%
Secondary	31%	27%	901-1,200	22%	25%
University	46%	54%	1,201-1,500	22%	18%
Occupational social class (SC)			1,501-1,800	14%	13%
SC: I	25%	27%	≥1,801	28%	17%
SC: II	10%	13%	Contract		
SC: III	22%	25%	Full-time	89%	75%
SC: IV	33%	22%	Voluntary part-time	5%	15%
SC: V	9%	13%	Non-voluntary part-time	6%	11%
District			Hours Week		
Sarrià-Sant Gervasi	10%	10%	≤20h	7%	14%
Les Corts	10%	10%	21-35	12%	19%
Eixample	10%	10%	35-40	49%	53%
Gràcia	10%	12%	≥41	33%	15%
Sant Martí-Poble Nou	9%	9%	Workers in Charge		
Ciutat Vella	12%	9%	No	75%	83%
Horta-Guinardó	9%	10%	Yes, ≤4	14%	11%
Sants-Montjuïc	11%	11%	Yes, 5-10	7%	3%
Sant Andreu	9%	10%	Yes, ≥11	5%	3%
Nou Barris	9%	9%			

5.2 Model selection

A total of 6 clustering models were performed in order to identify which of them fits better the data (Table 4). Both AIC and BIC indicated that the third model, the one with three clusters, fitted the data best; and the entropy value showed that 75% of the variance could be explained by that model. However, the three clusters model ended up grouping 72% of the population in the same cluster, a too large group of people with similar characteristics. In consequence it had been chosen the second most representative model: the model with four cluster.

Table 4: Fit values of different clustering models.

Model	Clusters	Log-likelihood	Resid. df	BIC	aBIC	cAIC	Likelihood-ratio	Entropy
Model 1	1	-7243.56	369	14591.57	14547.09	14605.57	1121.318	-
Model 2	2	-6927.094	354	14070.56	13978.43	14099.56	571.1902	0.54
Model 3	3	-6732.750	339	13793.79	13654.00	13837.79	299.3952	0.753
Model 4	4	-6690.319	324	13820.84	13633.40	13879.84	264.7579	0.708
Model 5	5	-6660.304	309	13872.73	13637.64	13946.73	213.3786	0.518
Model 6	6	-6637.942	294	13939.92	13657.18	14028.92	175.3342	0.541

5.3 Quality of employment clusters

The first cluster, that we have called “Powerful jobs” included a total of 170 working people (14%). They had a high probability of contract stability, in concrete 0.73 probabilities of being involved in a permanent contract. In this group, could also be found the highest probability of being self-employed with workers and it was by difference, the group with the highest probability of earning more than 1,801€ per month (0.64). For this type of jobs, working more than 41h per week became the most common, with a probability of 0.52. Finally, it was found high possession of authority and control because the probability of not having workers in charge was null.

The second cluster encompassed 220 workers (18%) and was called “Professional jobs”. It consisted basically in people who had a permanent contract (probability of 0.48) and self-employed without workers (0.42). In this group a different amounts of wages were found. But at least, 0.99 of the people earned more than 600€ per month. The same diversity appears with the total amount of hours worked per week: 0.23 probabilities of working between 21 and 35h, 0.36 between 36-40h and 0.38 \geq 41h per week. In this group regarding the number of workers in charge, a probability 0.95 corresponds to people without workers in charge.

The third cluster under the name “Standard jobs” was the biggest one and included a total of 680 working people (55%). Being part of this group, involved a probability of 0.79 of having a permanent contract, showing also a high stability. However, the salary with the highest probabilities was between 900 and 1,500€, being all wages in general lower than the two previous clusters. In this group, people who worked between 36 and 40h, with a probability of 0.72. Most of them did not have any workers in charge (0.88), however few of them (0.09) had less than 4 workers.

The last cluster was called “Precarious jobs”, contained a total of 164 workers (13%) and was characterised by the most adverse scores in all the indicators. In this group, the higher probability was to have a temporary contract (0.48) and to earn less than 600€ per month (0.61). The working hours consisted predominantly in less than 20h per week (0.60), and involved people with no workers in charge (1.00).

Table 5: Clusters characteristics of workers.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Total	170	220	680	164
Employment Status				
Permanent (Pr1)	0.73	0.48	0.79	0.32
Temporary (Pr2)	0.04	0.10	0.15	0.48
Self-empl. without workers (Pr3)	0.00	0.42	0.06	0.20
Self-empl. with workers (Pr4)	0.23	0.00	0.00	0.00
Salary				
≤600 (Pr1)	0.00	0.01	0.00	0.61
601-900 (Pr2)	0.00	0.19	0.05	0.24
901-1,200 (Pr3)	0.05	0.22	0.32	0.13
1,201-1,500 (Pr4)	0.14	0.13	0.31	0.00
1,501-1,800 (Pr5)	0.16	0.17	0.15	0.02
≥1,801 (Pr6)	0.64	0.25	0.17	0.00
Hours Week				
≤20h (Pr1)	0.02	0.03	0.03	0.60
21-35 (Pr2)	0.07	0.23	0.12	0.26
35-40 (Pr3)	0.38	0.36	0.72	0.10
≥41 (Pr4)	0.52	0.38	0.13	0.03
Workers in Charge				
No (Pr1)	0.00	0.95	0.88	1.00
Yes, ≤4 (Pr2)	0.49	0.05	0.09	0.00
Yes, 5-10 (Pr3)	0.25	0.00	0.02	0.00
Yes, ≥11 (Pr4)	0.24	0.00	0.01	0.00

Figure 4: Probabilities of the variables (cluster 4).

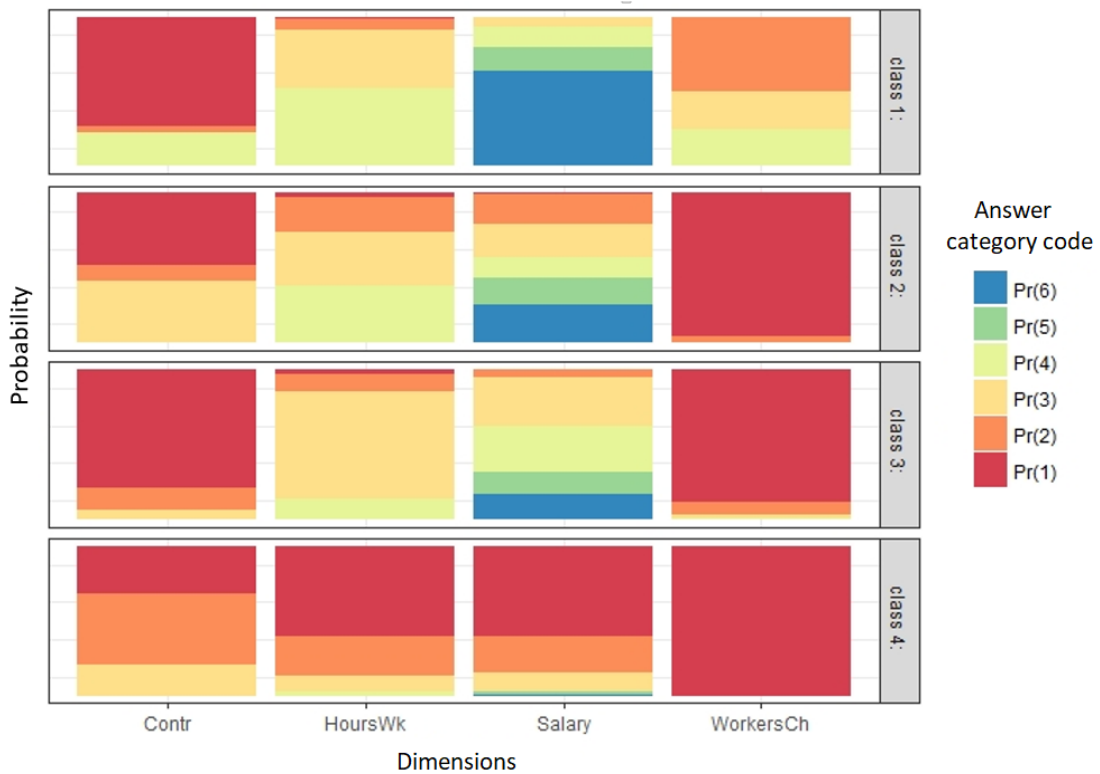


Table 6 shows the sample characteristics by clusters. The four clusters included a total sample of 1,234 salaried and independent working people. At first sight women tend to predominate in the third and fourth cluster, the ones with the worse quality of jobs (52% and 64% respectively) and men to the first and almost the second (65% and 49% respectively). Regarding the age, the cluster with the most precarious jobs (cluster 4) encompasses the highest proportion of young people. In contrast, the cluster of “Powerful jobs” is mostly formed by older people. For a large difference, Spanish people predominate in the first cluster while foreigners were more commonly involved in “precarious jobs” cluster. University degrees predominated in all the clusters, except for cluster 4, where secondary education had the highest proportion (37%). The level of Occupational Social Class is associated with the level of quality of employment of each cluster. In the first Occupational Social Class, people from the first cluster predominate; when lowering SC, the quality of employment of the clusters was also downsized. Looking at the health repercussions, apparently could be appreciated a better health status, both mental and self-assessed, for the first cluster, the one with the better quality of employment. The higher percentage of poor mental health or poor self-assessed health were found in the precarious job cluster.

Analysing the sample stratified by sex (Table 7), the age’s categories, nationality and social-class status were quite similar. However, the huge proportion of women with university degree in the first cluster (80%) was highlighted in contrast with the 62% of men for the same cluster. Regarding the health status, both sexes followed the same path: higher prevalence of poor mental health or poor self-assessed health in the fourth cluster and better health in the first one. Nevertheless, 9% of men expressed to have poor self-assessed health despite being in the first cluster in contrast with the 3% of women. Furthermore, women in the second cluster had higher proportion of poor mental health (21%) or self-assessed health (18%), in comparison with men (12% and 6% respectively).

Table 6: Sample characteristics of workers by cluster's classification.

	Cluster 1		Cluster 2		Cluster 3		Cluster 4	
	n	%	n	%	n	%	n	%
Total	170	14%	220	18%	680	55%	164	13%
Sex								
Men	111	65%	129	59%	329	48%	69	36%
Women	59	35%	91	41%	351	52%	104	64%
Age								
15-24	0	0%	10	5%	29	4%	30	18%
25-34	25	15%	51	23%	196	29%	49	30%
35-44	66	39%	83	38%	208	31%	47	29%
45-54	57	36%	50	23%	170	25%	19	12%
55-64	22	13%	26	12%	77	11%	19	12%
Nationality								
Spanish	137	81%	144	65%	482	71%	101	62%
Spanish + other	12	7%	19	9%	66	10%	19	12%
Foreigner	21	12%	57	26%	131	19%	44	27%
Education								
No studies	1	1%	2	1%	4	1%	1	1%
Primary	14	8%	50	23%	146	22%	52	32%
Secondary	39	23%	59	27%	208	31%	60	37%
University	116	68%	109	50%	320	47%	51	31%
Occupational social class (SC)								
I	86	51%	59	27%	143	21%	14	9%
II	24	14%	25	11%	64	9%	17	10%
III	36	21%	50	23%	175	26%	31	19%
IV	19	11%	62	29%	215	32%	62	38%
V	5	3%	24	11%	81	12%	40	24%
Mental Health								
Good	157	92%	185	84%	575	85%	129	79%
Poor	13	8%	34	16%	101	15%	34	21%
Self-assessed Health								
Good	158	93%	196	89%	612	90%	142	87%
Poor	12	7%	24	11%	68	10%	22	13%

Table 7: Sample characteristics of workers by cluster's classification, by sex.

	Cluster 1		Cluster 2		Cluster 3		Cluster 4	
	% men (n = 111)	% women (n=59)	% men (n = 129)	% women (n=91)	% men (n = 329)	% women (n=351)	% men (n = 60)	% women (n=104)
Total	18%	10%	21%	15%	52%	58%	9%	17%
Age								
15-24	0%	0%	3%	7%	5%	4%	23%	15%
25-34	14%	15%	25%	21%	28%	29%	28%	31%
35-44	38%	41%	41%	33%	29%	32%	28%	29%
45-54	32%	36%	20%	26%	25%	25%	12%	12%
55-64	15%	8%	11%	13%	13%	10%	8%	13%
Nationality								
Spanish	81%	80%	65%	66%	73%	69%	65%	60%
Spanish + other	8%	5%	9%	9%	8%	11%	8%	14%
Foreigner	11%	15%	26%	25%	19%	20%	27%	27%
Education								
No studies	1%	0%	2%	0%	1%	0%	2%	0%
Primary	9%	7%	23%	22%	26%	18%	37%	29%
Secondary	28%	14%	29%	23%	33%	28%	33%	38%
University	62%	80%	46%	55%	40%	54%	28%	33%
Occupational social class (SC)								
I	47%	58%	29%	24%	17%	25%	8%	9%
II	16%	10%	11%	12%	8%	11%	10%	12%
III	22%	20%	21%	25%	21%	30%	18%	19%
IV	14%	7%	33%	22%	42%	22%	37%	38%
V	2%	5%	7%	16%	12%	12%	27%	23%
Mental Health								
Good	94%	90%	88%	79%	86%	84%	83%	77%
Poor	6%	10%	12%	21%	14%	16%	17%	23%
Self-assessed Health								
Good	91%	97%	94%	82%	92%	88%	90%	85%
Poor	9%	3%	6%	18%	8%	12%	10%	15%

5.4 Effect of quality of work cluster on health

Table 8 shows the association between cluster adscription and dimensions of health outcomes. In model 1 (not adjusted) the association between the quality of employment and mental health was significantly associated for all the clusters in comparison with cluster 1 (reference) and was not linear. Cluster 2 (OR=2.33; CI 95%=1.13-4.35) and cluster 4 (OR=3.18; CI 95%=1.61-6.28) showed a higher and positive significant association between quality of employment and mental health than cluster 3 (OR=2.12; CI 95%=1.15-3.88) in comparison with cluster 1. For self-assessed health, cluster 4 had an almost significant association between quality of employment and poor self-assessed health (OR=2.03; CI 90%=0.97-4.27).

Adjusting according to sociodemographic characteristics such as sex, age (model 2) and nationality (model 3), the significant association and direction between health and quality of work of clusters did not change. These variables had a significant association with health but not through the quality of employment. In the fourth model, when educational attainment was added, the relationship between quality of employment and health changes. Cluster 4 almost showed a significant association between quality of employment and poor mental health

(OR=1.85; CI 90%=0.89-3.83). Finally, with the fifth model and the addition of the Occupational Social Class the quality of employment by clusters loses all the statistical association with mental and self-assessed health.

Table 8: Logistic regressions odds ratios: health and quality of employment in salaried and independent workers (Barcelona, 2016).

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Mental	SAH	Mental	SAH	Mental	SAH	Mental	SAH	Mental	SAH
Quality of employment										
Cluster 1	1	1	1	1	1	1	1	1	1	1
Cluster 2	2.22**	1.61	2.13**	1.81	2.00**	1.72	1.66	1.38	1.56	1.20
Cluster 3	2.12**	1.46	1.97**	1.59	1.89**	1.51	1.55	1.15	1.40	0.96
Cluster 4	3.18**	2.04*	2.82**	2.63**	2.64**	2.30**	1.85*	1.53	1.63	1.20
Sex										
Men			1	1	1	1	1	1	1	1
Women			1.36**	1.63**	1.32*	1.59**	1.49**	1.82**	1.51**	1.92**
Age										
15-24			1	1	1	1	1	1	1	1
25-34			1.24	2.09	1.18	1.94	1.38	2.29	1.38	2.31
35-44			1.17	3.91*	1.42	3.71*	1.24	4.00*	1.23	4.02*
45-54			0.91	7.40**	0.94	7.71**	0.96	8.02**	0.94	7.84**
55-64			1.04	12.35**	1.14	13.96**	1.11	14.25**	1.09	14.31**
Nationality										
Spanish					1	1	1	1	1	1
Spanish + other					2.14**	2.48**	1.98**	2.35**	1.77**	1.97**
Foreigner					1.53**	1.68**	1.49*	1.59*	1.31	1.33
Education										
No studies							1	1	1	1
Primary							0.62	0.30	0.65	0.31
Secondary							0.47	0.24*	0.53	0.27*
University							0.23*	0.10**	0.29	0.17**
Occupational social class										
I									1	1
II									1.04	1.33
III									1.05	1.71
IV									1.43	2.50*
V									1.61	2.64*

**Correlation significant at $p=0.05$ *Correlation significant at $p=0.1$

When stratifying the models by sex (see annex Tables 10 and 11), men did not show any significant association between the quality of employment and self-assessed health for any of the models. Regarding mental health, men from cluster 3 and 4 showed a linear and significant association between the quality of employment and mental health. This significance disappeared when education and SC were added to the models.

On the other hand, women showed a completely different situation to men (see also annex). In model one women showed a significant and linear association between the quality of employment and mental health for all the clusters and a significant and non-linear association with self-assessed health. From this model, the significant association with mental health started losing significance and it's completely lost in model 3 when nationality was added. Self-assessed health maintains a significant association with cluster 2 for all the different models, but the other clusters lost it with the addition of education and SC.

5.5 Quality of employment and income of the districts

The grouping classification of districts depending on their income according to the City Council distribution of family income and the quality of employment distribution of clusters could be found in table 8. The quality of employment distribution among the ten districts of Barcelona was mapped in Figure 5. The four types of clusters were present in all the districts. In all areas, cluster 3 predominates by far because was the most popular quality of employment among the citizens. However, clusters 1 and 4 can be seen more predominantly in certain parts of the city.

Table 9: Clusters distribution by districts

		Cluster 1	Cluster 2	Cluster 3	Cluster 4	
Far above from the city average (\bar{x} = 33,044€)	Sarrià-Sant Gervasi	29%	26%	35%	9%	100%
	Les Corts	23%	15%	49%	13%	100%
Above and relatively close to the average (\bar{x} = 23,321€)	Eixample	13%	16%	55%	16%	100%
	Gràcia	13%	19%	55%	13%	100%
Below and relatively close to the average (\bar{x} = 16,885€)	Sant Martí-Poble Nou	9%	22%	55%	16%	100%
	Ciutat Vella	8%	21%	59%	12%	100%
	Horta-Guinardó	16%	17%	54%	13%	100%
	Sants-Montjuïc	8%	13%	68%	11%	100%
	Sant Andreu	13%	14%	56%	16%	100%
Far below from the average of the city (\bar{x} = 11,427)	Nou Barris	10%	15%	59%	17%	100%

Average of Barcelona \bar{x} = 20,858 (2016).

Figure 5: Quality of employment distribution by districts in Barcelona

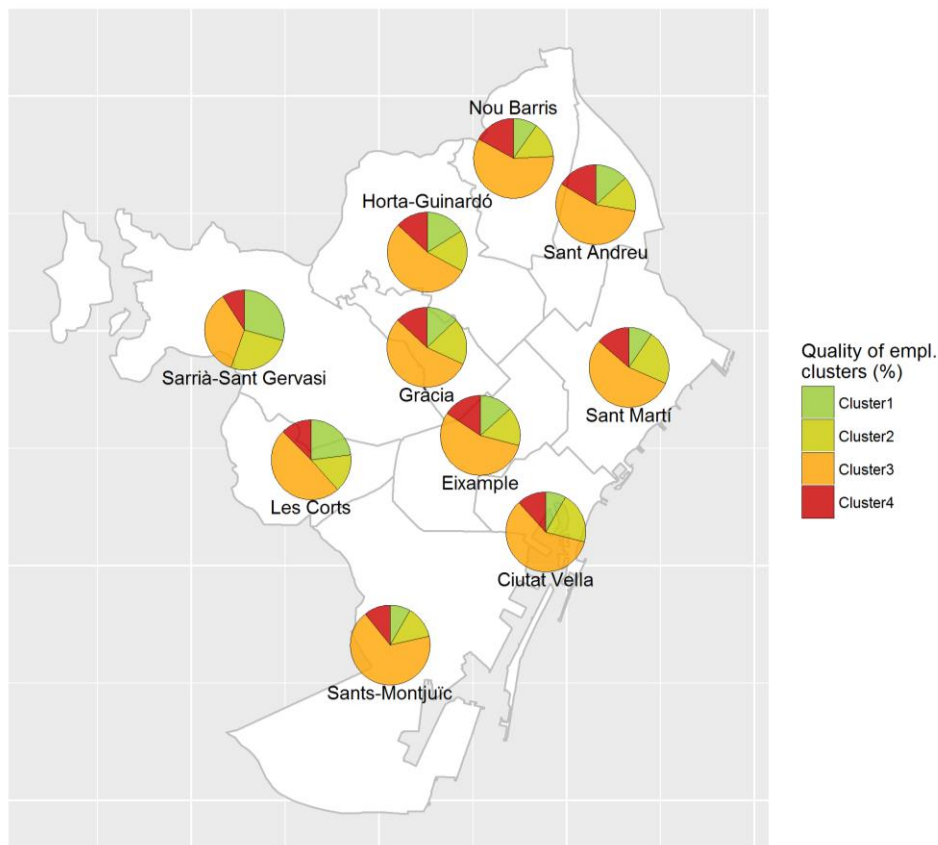


Table 9 showed the cluster predominance for each district depending on the average of Barcelona. Sarrià-Sant Gervasi and Les Corts were the two districts with a family income far above the average of Barcelona, and in both areas, cluster 1 predominated. In the second group of family income, above and relatively close to the average of the city, in the district of Eixample surprisingly had predominated the cluster with the worse quality of employment (cluster 4) and in Gràcia the cluster 2. The third group, formed by five districts with a family income average of 16,885€, below the mean of Barcelona, the predominance of clusters was quite peculiar. In Sant Martí-Poble Nou and in Ciutat Vella, cluster 2 predominated, whereas, in Horta-Guinardó, the cluster with the best quality of work predominated (cluster 1). Cluster 3 predominated in the district of Sant-Montjuïc and finally, the cluster with the worse quality of employment (cluster 4) predominated in the district of Sant Andreu. Lastly, Nou Barris, the district with the lowest family income average, had a predominance of the cluster 4.

Table 9: Cluster predominance above (>1) or below (<1) the average of Barcelona.

District	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Sarrià-Sant Gervasi	2.13	1.47	0.64	0.68
Les Corts	1.68	0.86	0.89	0.94
Eixample	0.97	0.88	1.00	1.18
Gràcia	0.95	1.06	1.00	0.98
Sant Martí-Poble Nou	0.68	1.25	0.99	1.03
Ciutat Vella	0.60	1.16	1.07	0.89
Horta-Guinardó	1.17	0.94	0.98	0.99
Sants-Montjuïc	0.60	0.74	1.23	0.81
Sant Andreu	0.96	0.80	1.02	1.23
Nou Barris	0.70	0.81	1.02	1.23

5.6 Quality of employment and health of the districts

The association between the quality of employment and mental and self-assessed health had been represented by maps. Figure 6 shows the average of mental health distribution of citizens by districts, whereas Figure 7 the average of self-assessed health. Figure 8 represents the predominance of the cluster from the Barcelona average, giving rise to a single characteristic cluster for each district.

Les Corts and Sarrià-Sant Gervasi presented the same best position (1st quartile) both for mental and self-assessed health. Furthermore, these two districts also belonged to the cluster of the best quality of employment. The same happened with Sants-Montjuïc, which had the same classification for both dimensions of health (3rd quartile), and where the third cluster predominated. On the other side of the tail, the district of Nou Barris was classified in the 4th quartile for both dimensions of health, and also in the last position regarding the cluster prevalence, being in the worse position for all the fields. The districts of l'Eixample was classified also into the same level of both health dimensions (quartile 2), however, in this district, the fourth cluster predominated.

Of the remaining three districts, all of them presented an equivalence with the cluster and just one of the health dimensions: Ciutat Vella and Sant Andreu were classified in the same level according to the self-assessed health and Horta-Guinardó according to the mental health

situation. The other ones, Gràcia and Sant Martí-Poble Nou did not present any association between the health variables and the cluster of quality of employment.

Figure 6: Map of mental health distribution by districts.

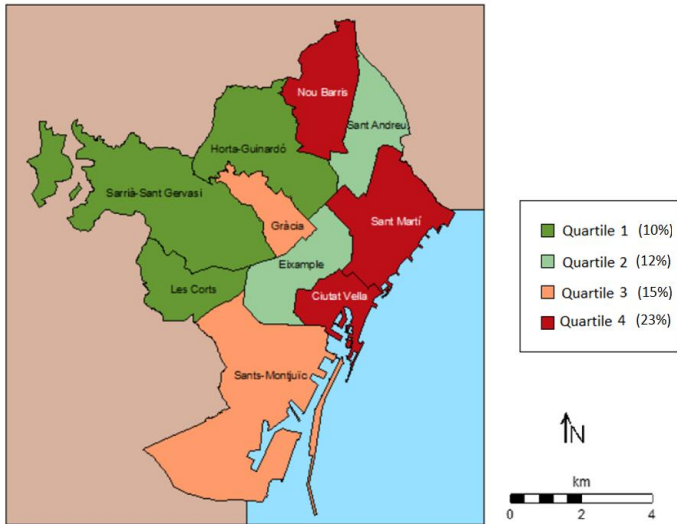


Figure 7: Map of self-assessed health distribution by districts.

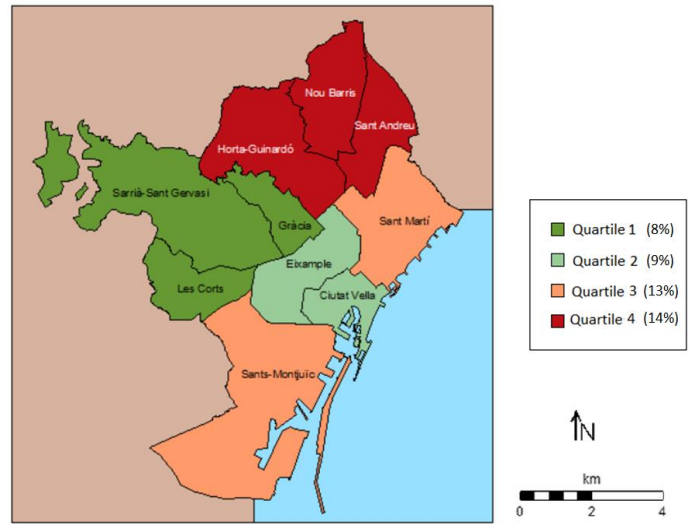
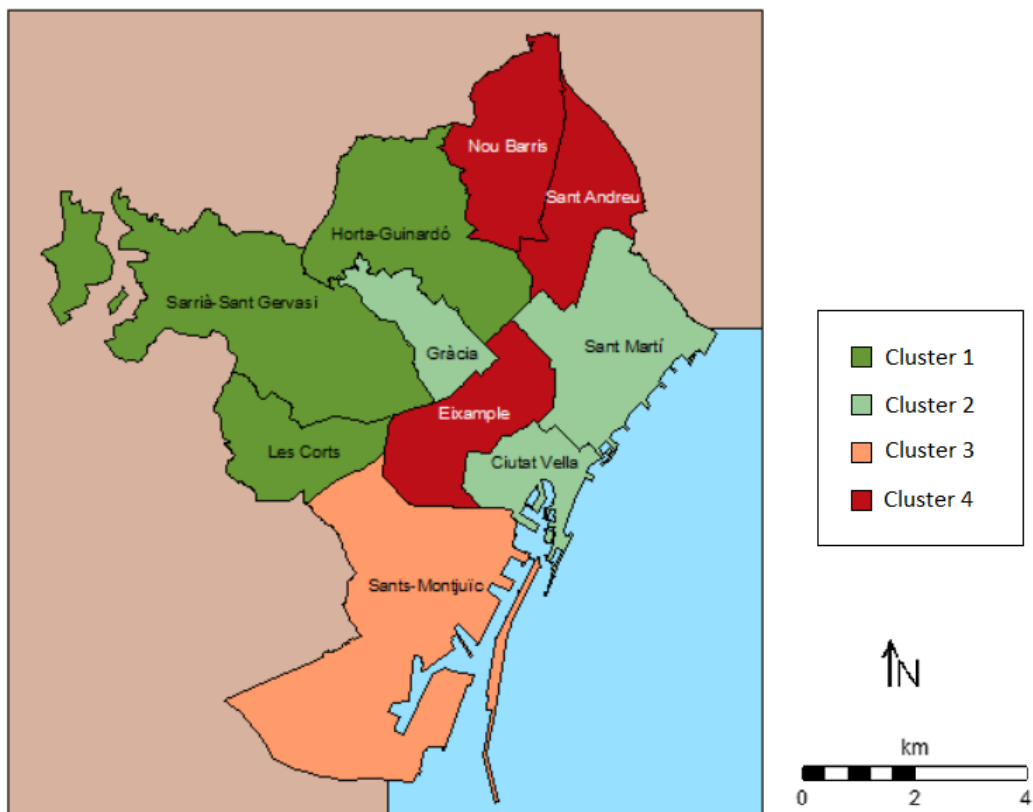


Figure 8: Map of cluster predominance by districts.



6. Discussion

In this article, the concept of quality of employment was assessed by the creation of clusters based on four main variables selected on the basis of previous literature: employment status, salary, hour's week and authority/responsibility (workers in charge). As a result, 1,234 working people were classified into four groups well characterised and defined.

The first cluster "Powerful jobs" was composed of professional jobs, formed by people mostly working with a permanent contract or by self-employed with workers. This group earned the highest amount of income, with a very small probability of low income, and also spent more hours per week on their workplace. This situation of long working hours involvement in return for high-income rewards can be explained by the "high-performance management system" (Murray et al., 2002). In this group, working long hours become the (implicit) norm as a "price" for their privileged position that employees have to pay (Murray et al., 2002). Moreover, as a huge amount of people had workers in charge, the main bosses and head-professionals with a lot of power and authority predominated, being this group the most powerful. These jobs were characterised by the best quality of employment. Despite being the group with the longest work-time, was also the one with the best health status, both mental and self-assessed.

The second group the "Professional jobs" consisted basically of people who had a permanent contract and self-employed without workers. This time the amount of wage varied a lot: everybody from this group earned more than 600€ and few of them more than 1,801€. Also, a large diversity was found for the amount of working hours and overall people did not use to have a lot of workers in charge. In summary, the jobs that could be found here were mostly stable, full-time work that provided enough income for the working time that is required, but with a low level of responsibility.

The third group, the "Standard jobs", apart from being the biggest one, showed also high levels of stability. This time, salaries were lower but the amount of time worked was also high. People from this group did not use to have workers in charge. So, this cluster was composed of people with stables jobs but without authority positions and with less income, leading to a group with a lower quality of employment that encompasses the larger quantity of workers.

Finally, the last cluster, called "Precarious jobs" contained people with the most adverse scores for the different dimensions. This time, the stability was very low because the employment status with the highest proportion was the temporary contracts. Also, the wages were very low, the hours per week worked were very few, and nobody had workers in charge. These conditions of low income and working hours prevent people from being independent (Vives et al., 2010) and mainly lower socioeconomic profiles predominate.

In our study, the most privileged group ("Powerful jobs") was mostly formed by highly educated employees, most of them men (65%). On the other side, the cluster with the worse quality of employment ("Precarious jobs") was formed mostly by women (64%) who had secondary education, by foreigners and young people, leading to a great social, economic, labour and demographic difference between these two groups. Through empirical research, other authors in their studies had detected a category of privileged workers similar as ours (De Beer, 2002 & Van Aerden, 2014). In addition, the fact that a high proportion of women (Elder, 2010 & Young,

2010), youth (Rodgers, 1989 & Vosko, 2006) and low educated people (van Aerden, 2014) predominate in precarious jobs also goes in line with other previous findings.

The association between the quality of employment by clusters and mental and self-assessed health was significant while none controlling variable was added. Cluster one always presented the best health, both for mental and self-assessed, in comparison with all the other clusters. The fourth cluster had always been the one with the highest risk of having poorer mental and self-assessed health. Cluster 2 and 3 switched positions: workers from cluster 3 had a lower risk of having poor health and workers from cluster 2 a higher. The relationship between quality of employment and health appeared as non-linear.

Sex, age and nationality were variables that produced an effect on health but not through the quality of employment, because the association between the quality of employment and health remained significant. However, when adding the educational attainment, self-assessed health lost the significant association with the quality of employment and just cluster 4 maintained it for mental health. The relationship between highly educated people with better health status had been reported repeatedly in the literature (Kawachi et al., 2010). Education affects wages strongly, being people with the highest educational level the ones who earned most (Robinson et al., 1997) and the higher wages were found in the first cluster, the one with the better quality of employment and health. The significant association for all the clusters was lost when the occupational social class was added in the model. This fact could be explained by a possible collinearity between the occupational social class and the quality of employment variable. A collinearity effect could be explained because some of the dimensions of the quality of employment construct are close related with the occupational social class.

When analysing the association stratified by sex, men and women showed interesting and different results. Men showed a significant association only between the quality of employment and mental health. A linear association was present: as lower is the quality of employment, higher is the risk of having poor mental health. However, women showed a significant and linear association between the quality of employment and mental health (same as men), but non-linear with self-assessed health, where cluster 2 and 3 switched positions. The trend for both sexes was to increment the probability of having poorer mental health when the quality of employment gets worse. That confirms the first hypothesis: as more SER-like jobs, better favourable job characteristics and working conditions will have employees (Van Aerden et al., 2014), which influence health. All the significances disappeared when education and occupational social class were added to the models, but not for women from cluster 2 for self-assessed health. The ASPB (2016) has pointed out that poor self-assessed health increments with age and women are more affected than men. It goes from 8.9% in women of the age group of 15-44 years, to 47.4% in those over 64 years of age; for men, it goes from 7.7% to 36.7% in the same age groups (ASPB, 2016).

At the aggregate level, clusters were distributed among all the districts with the same proportions approximately, since some districts as Eixample and Horta-Guinardó had all clusters close to average (0.80-1.20). However, the first cluster predominated in the districts with the highest economic level, Sarrià-Sant Gervasi and Les Corts. Specially, Sarrià-Sant Gervasi, the richest district of Barcelona, presented the highest value of cluster 1 (respect the average of the city), followed by the cluster 2 with a value of 1.47. In the opposite site, appeared Sant Andreu

and Nou Barris, the poorest district of the city, with predominance of cluster 4 with a value over 1.20. Between the extremes the picture was not so clear. That confirms the second hypothesis: richest districts had a predominance of cluster 1, whereas the poorest, of cluster 4.

At the time of analysing the health became important, for its different results, the distinction between two different concepts: mental and self-assessed health (physic and mental). Not all the districts presented the same level of mental and self-assessed health. Regarding the association between the quality of employment and health among the districts, the most privileged (Sarrià-Sant Gervasi and Les Corts) and the most unfortunate one (Nou Barris) shared the same level of association between the quality of employment and health, both mental and perceived. Nou Barris was shown as the district with the most socioeconomic deprivation of Barcelona, with very low quality of employment and health. Nowadays, the City Council is improving living and working conditions of this district in order to reduce inequalities with regard to Barcelona (ASPB, 2015). Our hypothesis about the relationship between the quality of employment and health conditions was just true for Sarrià-Sant Gervasi, Les Corts and Nou Barris, that is, the two extremes. Again, it is present a strong polarization of quality of employment, economic level and health status between the richest and the poorest districts.

Some limitations and issues should be kept in mind when interpreting the results of this research. Firstly, these results are a “snapshot” based on 2016, when the Barcelona Health Survey (cross-sectional data) was conducted, thus no causalities between the quality of employment and health can be exported. Although, the results go in line with other previous findings. Moreover, despite having a sample larger enough to be representative of the city of Barcelona, it is no longer significant when it is analysed at districts level. It takes between 9% (160 working people) and 11% (188 working people) of the population for each district, very low values that are not enough representative. As a consequence, it is also a low-power study since the number of cases with poor health (both mental and self-assessed) were very low. Another limitation could be the fact that only subjective variables of health were used. However, mental (Golberg-12) and self-assessed health are validated tools and are able to measure health. Also, it was not included any adjusting variable such as morbidity or other diseases that are directly health influencers. Although in principle, the selected population must be healthy and be able to work. People who were disabled or did not work due to an illness were not included in the sample.

The most important strength of this work is the contribution to the district profile with data on quality of employment. The different dimensions of quality of employment are used to create clusters and their spatial distribution among the districts of the city of Barcelona is examined. At the same time, the study reinforce the association between the quality of employment with health (mental and self-assessed) and income. Another multi-dimension approach of the quality of employment has been created that not only takes into account the temporality dimension. Finally, the sample population covers a huge range of workers because independent (self-employed) and salaried workers were taken into account, contrary to other studies that only observe salaried workers.

6.1 Conclusions

The level of quality of employment goes in line with the level of health and the average income of the districts that are in the best (Sarrià-Sant Gervasi and Les Corts) and in the worse (Nou Barris) positions. Being the better, the best for all the aspects, and the worse the worst leading to great inequalities within the city of Barcelona. It is concluded that a multi-dimensional approach becomes useful in order to assess the quality of employment because using just one-dimension of employment gives limited insight.

Future studies are needed that use a multi-dimensional approach to the quality of employment with longitudinal data in order to obtain causal inferences. Also, a larger sample population of the different districts of Barcelona is needed in order to get a more precise geographical analysis.

7. References

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8. Annex

Table 10: Logistic regressions odds ratios: health and quality of employment in salaried and independent workers (men) (Barcelona, 2016).

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Mental	SAH	Mental	SAH	Mental	SAH	Mental	SAH	Mental	SAH
Quality of employment										
Cluster 1	1	1	1	1	1	1	1	1	1	1
Cluster 2	1.97	0.66	1.94	0.83	1.81	0.82	1.54	0.57	1.45	0.59
Cluster 3	2.43**	0.87	2.43**	1.07	2.39**	1.07	1.96	0.71	1.76	0.72
Cluster 4	3.03**	1.12	3.30**	2.18	3.08**	1.95	2.28	0.99	1.88	1.10
Age										
15-24			1	1	1	1	1	1	1	1
25-34			2.14	0.07**	1.93	0.06**	2.37	0.07**	2.41	0.06
35-44			2.03	0.30**	1.96	0.26**	2.23	0.29**	2.22	0.28**
45-54			1.57	0.46**	1.57	0.43**	1.77	0.48*	1.71	0.48**
55-64			2.01	-	2.29	-	2.43	-	2.31	-
Nationality										
Spanish					1	1	1	1	1	1
Spanish + foreigner					2.31**	2.05	2.06*	1.95	1.90	2.03
Foreigner					1.83**	1.54	1.89**	1.67	1.72*	1.73
Education										
No studies							1	1	1	1
Primary							1.17	0.60	1.28	0.53
Secondary							1.23	0.32	1.39	0.27
University							0.42	0.09**	0.56	0.08**
Occupational social class (SC)										
I									1	1
II									2.05	0.55
III									1.53	0.89
IV									1.62	0.96
V									2.45	0.58

**Correlation significant at $p=0.05$ *Correlation significant at $p=0.1$

Table 11: Logistic regressions odds ratios: health and quality of employment in salaried and independent workers (women) (Barcelona, 2016).

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Mental	SAH	Mental	SAH	Mental	SAH	Mental	SAH	Mental	SAH
Quality of employment										
Cluster 1	1	1	1	1	1	1	1	1	1	1
Cluster 2	1.33*	6.97**	2.27	6.66**	2.16	5.96**	1.75	5.19**	1.73	4.15*
Cluster 3	1.65	3.87*	1.59	4.39**	1.52	3.91	1.16	3.09	1.15	2.50
Cluster 4	2.65**	5.18**	2.45*	6.86**	2.25	5.71**	1.53	4.25	1.47	3.01
Age										
15-24			1	1	1	1	1	1	1	1
25-34			0.92	1.71	0.89	1.62	1.92	1.88	1.03	1.99
35-44			0.88	2.26	0.85	2.14	0.92	2.28	0.93	2.29
45-54			0.67	4.84**	0.69	5.29**	0.62	5.37**	0.62	5.50**
55-64			0.68	6.31**	0.72	7.26**	0.65	7.90**	0.67	8.85**
Nationality										
Spanish					1	1	1	1	1	1
Spanish + foreigner					2.08**	2.74**	2.09**	2.65**	1.84*	1.76
Foreigner					1.32	1.76*	1.23	1.61	1.09	1.07
Education										
No studies							1	1	1	1
Primary							3.02**	1.83*	2.35**	0.84
Secondary							1.64*	1.94**	1.40	1.06
University							-	-	-	-
Occupational social class (SC)										
I									1	1
II									0.63	1.90
III									0.84	2.44*
IV									1.38	4.67**
V									1.19	6.08**

**Correlation significant at $p=0.05$ *Correlation significant at $p=0.1$