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**UNDERSTANDING THE RELATIONSHIP OF LONG WORKING HOURS WITH  
HEALTH STATUS AND HEALTH-RELATED BEHAVIOURS**

*Running title: Long working hours and health*

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## SUMMARY

**Background:** The objectives of this study are to identify family and job characteristics associated with long workhours, to analyse the relationship between long workhours and several health indicators and to examine whether gender differences for both objectives exist.

**Methods:** The sample was composed of all salaried workers aged 16-64 years (3950 men and 3153 women) interviewed in the 2006 Catalonian Health Survey. Weekly workhours were categorized as less than 30 hours (part-time), 30-40 (reference category), 41-50 and 51-60 hours. Multiple logistic regression models separated by sex were fitted.

**Results:** Factors associated with long working hours differed by gender. Among men extended workhours were related with being married or cohabiting and with being separated or divorced. In males, working 51-60 hours a week was consistently associated with poor mental health status (aOR=2.06, 95% CI=1.31-3.24), self-reported hypertension (aOR=1.60, 95% CI=1.12-2.29), job dissatisfaction (aOR=2.05, 95% CI=1.49-2.82), smoking (aOR=1.33, 95% CI=1.03-1.72), shortage of sleep (aOR=1.42, 95% CI=1.09-1.85) and no leisure-time physical activity (aOR=2.43, 95% CI=1.64-3.60). Moreover, a gradient from standard working hours to 51-60 hours a week was found for these six outcomes. Among women it was only related to smoking and to shortage of sleep.

**Conclusion:** The association of overtime with different health indicators among men could be explained by their role of family breadwinners that in situations of family financial stress can derived into pressure to work overtime in order to increase the income and/or acceptance of poor working conditions, one of them being long working hours, due to fear of job loss.

## **INTRODUCTION**

Although in recent years interest in health problems related to long working hours has intensified, the number of studies concerning the different areas of health is still low and the results are often contradictory.<sup>1-4</sup> The inconsistent findings can be related to several methodological shortcomings of previous research, including small sample sizes or unique industry specific circumstances<sup>5-9</sup> that limit generalisability of the findings.

Most studies have analysed samples composed of self-employed and salaried workers, but the reasons and the compensations associated with working long hours may differ between these two groups, and therefore the impact of long working hours on health status. It is noteworthy that most epidemiological studies on long workhours and health have been conducted in Japan and have focused on very long working hours but little is known about moderately long workhours.<sup>10</sup> Some studies that have failed to find an association between poor health and long working hours have considered working hours as a continuous variable and assumed a linear relationship.<sup>11,12</sup> However, individuals working few hours are more likely to do so due to a reduction of their usual workhours as a consequence of serious health conditions. Therefore, these studies could have underestimated the association between poor health status and long working hours. It has been pointed out that further studies are needed that take into account some potential confounding or interacting variables such as gender, work characteristics, or domestic work.<sup>1,3</sup>

Most studies on the health impact of long workhours have been carried out among men or have considered sex as an adjusting variable. Nevertheless, there are several reasons why the impact of long workhours can differ by gender.<sup>1</sup> On one hand, physiological changes related to long workhours may not be the same for men and women.<sup>13</sup> Moreover, long workhours can contribute to the double burden of full-time and domestic work. Several studies have reported

the damaging effects of work conflict and work overload among women who have to balance the responsibilities of both job and family.<sup>14-16</sup> In addition, more noticeable effects of long workhours have been observed among women, something often attributed to the additional domestic stressors experienced by women as a result of gender inequalities in the distribution of domestic tasks.<sup>17-19</sup> Working long hours depends to a great extent on family responsibilities and constraints imposed by the labour market. Due to both gender segregation within the labour market and family responsibilities, men and women probably work long hours for different reasons; hence the work conditions associated with their schedules also differ. Consistent with the gender division in the domestic sphere, with women responsible for housework and caring tasks and men usually assuming the breadwinner role, living with children is related to part-time work among women, while, among men, it is likely to be associated with long hours.<sup>20</sup>

Regulation on working hours differs across countries. The European Union (EU) work hours directive has included a maximum of 48 hours of work per week.<sup>17</sup> Yet, there are differences among European countries. For example, the Spanish law is more restrictive and establishes a maximum of 40 contractual work hours and a maximum of 80 hours of overtime per person and year.<sup>21</sup> However, it has been pointed out that overtime regulation, not only in Spain but in the EU, is undermined by illegal practices, as well as the widespread use of special rules and exemptions for certain sectors, types of company and occupational categories.<sup>22</sup> The Japanese government has implemented administrative guidance on overtime, which suggests that all employees should not work 45 hours of overtime per month and that there will be government intervention if overtime exceeds 100 hours per month.<sup>23</sup> In the United States there is no regulation regarding limiting working time for adults.

The objectives of this study were (a) to identify family and job characteristics associated with long workhours, (b) to examine the relationship between long workhours and a variety of health outcomes and health-related behaviours, and (c) to examine whether gender differences exist for both objectives.

## **METHODS**

The data have been taken from the 2006 Catalonian Health Survey, a cross-sectional survey based on a representative sample of the non-institutionalised population of Catalonia, a region in the North-east of Spain which has about 7 million inhabitants. The survey included self-reported information on morbidity, health status, health-related behaviours and use of health care services, as well as socio-demographic data. A sample of 18,126 subjects was selected using a multiple stage random sampling strategy with a maximum global error of  $\pm 0.7\%$ .

Trained interviewers administered the questionnaires at home in a face-to-face interview.

Only 27% of respondents were replaced as a result of refusal or absence.<sup>24</sup> For the purposes of this study a subsample of all salaried workers with a contract aged 16-64 was selected. In order to avoid the effect of extremely long workhours, people working more than 60 hours a week were excluded (2.1% of men and 0.7% of women). The final sample under analysis was composed of 3950 men and 3153 women.

### **Variables**

Working hours were determined using the question: "In the last week (or the last whole week you worked) how many hours did you work?" The response alternatives were <30 hours (part-time job), 30–40 hours (reference category), 41-50 hours, and 51-60 hours a week.

## **Health and well-being outcomes**

Self-perceived health status was elicited by asking the respondents to describe their general health as “excellent”, “very good”, “good”, “fair”, or “poor”. This is a broad indicator of health related well being<sup>25</sup> and has also proved to be a good predictor of mortality, even better than the medical diagnostic.<sup>26</sup> The variable was dichotomised by combining the categories “fair” and “poor” to indicate perceived health as poor health status and the categories “excellent”, “very good” and “good” to indicate good health status. Mental health status was measured with the 12-item version of the General Health Questionnaire. We used a two-point scoring method, rating a problem as absent (0) or present (1). The responses were summed, and the participants scoring 3 or more were classified as cases.<sup>27</sup> Hypertension was determined by asking people whether they suffered from hypertension or had been diagnosed by a health care professional as having hypertension. Self-reported hypertension has been found to agree with reports in medical records<sup>28,29</sup> and with personal blood pressure measurements.<sup>30</sup> Job satisfaction was measured with the question “All in all, how satisfied would you say you are with your job?”. There were four categories, from “very satisfied” to “very dissatisfied”. The responses were dichotomised by combining the categories “very satisfied” and “satisfied” to indicate satisfaction and the categories “dissatisfied” and “very dissatisfied” to indicate job dissatisfaction.

## **Health-related behaviours**

Smoking behaviour was categorized as “no” (current non-smokers and smokers of fewer than one cigarette a day) or “yes”. For leisure-time activities, a dichotomous variable was created, comparing no physical activity with slight, moderate, or high intensity of sport activities. The daily number of hours slept was categorized as  $\leq 6$  hours and  $>6$  hours.

### **Employment conditions**

Occupational social class, assigned according to the respondent's current occupation, was measured with a widely used Spanish adaptation of the British classification.<sup>31</sup> Because of the small number of persons in some categories, the six original social classes were collapsed into the following three broad classes: I and II (more privileged classes), III, and IVA-IVB-V (manual workers). Type of contract had three categories: Permanent, fixed-term temporary contract and non-fixed term temporary contract. Shift type was coded as day, night, shifts and variable depending on the day.

### **Family and domestic characteristics**

Marital status was classified into four categories: married or cohabiting, single, separated or divorced, and widowed. Number of children living at home was coded into three categories: none, one and two or more. Weekly hours of domestic work were recorded as <10 hours, 10–20 hours, and >20 hours.

### **Data analysis**

First, gender differences for all of the dependent and independent variables were tested at the bivariate level using the chi-square test for categorical variables and the t-test for age. Second, factors associated with working 41-50 or 51-60 hours a week as compared with working 30-40 hours, were identified by fitting multiple logistic regression models for the men and women separately and including age, and job and family characteristics. Third, multiple logistic regression models separated by gender and adjusted for age, and job and family characteristics were fitted in order to test the association between long workhours and all of the health indicators.

## **RESULTS**

### **General description of the population**

Table 1 shows a general description of the population. Regarding health outcomes, no gender differences were found for job satisfaction, women were more likely to report poor self-perceived health status and poor mental health status, whereas self-reported hypertension was more frequent among men. Smoking prevalence was higher among men but no gender differences were observed for leisure time physical activity or daily number of hours slept.

Table 1. General description of the population (in percentages). Catalonia Health Survey, 2006.

	Men (n=3950)	Women (n=3153)	p
<i>Health outcomes</i>			
Self-perceived health status			<0.001
• Excellent	10.3	8.4	
• Very good	29.0	27.5	
• Good	51.1	48.2	
• Fair	8.6	13.9	
• Poor	1.0	2.0	
Poor mental health status (GHQ-12≥3)	5.5	13.1	<0.001
Self-reported hypertension	12.0	8.6	<0.001
Job satisfaction			0.482
• Very satisfied	16.5	20.2	
• Satisfied	70.4	66.1	
• Dissatisfied	11.3	11.7	
• Very dissatisfied	1.8	2.0	
<i>Health-related behaviours</i>			
• Smokers	34.2	28.9	<0.001
• No leisure time physical activity	7.2	7.2	0.521
• Daily number of hours slept ≤6	27.6	26.5	0.227
<i>Employment conditions</i>			
Number of hours of paid work a week			<0.001
• Less than 30 hours	4.5	16.1	
• 30-40 hours (standard)	57.8	67.1	
• 41-50 hours	30.1	14.5	
• 51-60 hours	7.6	2.3	
Type of contract			0.015
• Permanent	80.6	80.0	
• Fixed-term temporary contract	14.0	15.7	
• Non-fixed term temporary contract	5.4	4.3	
Shift type			<0.001
• Day	80.2	83.2	
• Night	3.1	2.3	
• Shifts	10.0	6.6	
• Variable, depending on the day	6.7	7.9	
<i>Family and domestic characteristics</i>			
Marital status			<0.001
• Single	31.2	27.9	
• Married or cohabiting	65.4	64.3	
• Widowed	0.6	1.4	
• Separated/divorced	2.8	6.4	
Number of children			<0.001
• None	52.9	47.7	
• One	22.0	25.7	
• Two or more	25.1	26.6	
Weekly hours of domestic work			<0.001
• < 10 hours	66.8	27.4	
• 10-20 hours	26.2	45.1	
• >20 hours	7.0	27.5	
<i>Sociodemographic characteristics</i>			
Age (mean and standard deviation)	38.2 (11.2)	37.1 (10.7)	<0.001
Social class			<0.001
• I-II (more privileged classes)	19.6	26.0	
• III	20.9	29.1	
• IV-V (manual workers)	59.5	44.9	

Note: Representative sample of salaried workers of Catalonia (Spain) aged 16-64, working up to 60 hours.

Women were more likely to work part-time, whilst working 41-50 hours or 51-60 hours was more frequent among men. 30.1% of men reported working 41-50 hours a week and 7.6% 51-60 hours. The corresponding proportions for women were 14.5% and 2.3% respectively. Conversely, number of hours of domestic work were higher among women. Whereas 27.5% of women worked more than 20 hours a week, the proportion among men was 7.0%.

### **Factors related to long workhours**

Table 2 shows factors associated with working 41-50 hours as compared with working 30-40 hours by gender. In both sexes, long workhours were more frequent among those with variable shifts depending on the day and was negatively associated with age. Additionally, among women, it was positively associated with night shifts and negatively related to non-fixed term temporary contracts and to more than 20 hours of domestic work a week. Whilst among women no association was found between long workhours and family roles, men married or cohabiting (aOR=1.42, 95% CI=1.13-1.77), separated or divorced (aOR=2.19, 95% CI=1.38-3.46) or having two or more children (aOR=1.25, 95% CI=1.02-1.55) were more likely to work 41-50 hours.

**Table 2. Factors associated with working 41-50 hours a week compared with working the standard number of hours (30-40 hours). Adjusted odds ratios (aOR) and 95% confidence intervals (CI). Catalonia Health Survey, 2006.**

	Men (n=3475)		Women (n=2573)	
	%	aOR (95% CI)	%	aOR (95% CI)
Type of contract				
• Permanent	34.6	1	17.2	1
• Fixed-term temporary contract	32.6	0.89 (0.71-1.11)	22.5	1.10 (0.82-1.47)
• Non-fixed term temporary contract	33.9	0.93 (0.67-1.30)	11.9	0.49 (0.25-0.98)*
Shift type				
• Day	34.9	1	16.7	1
• Night	25.3	0.63 (0.39-1.00)	28.8	2.16 (1.16-4.01)*
• Shifts	26.8	0.67 (0.52-0.86)**	21.1	1.17 (0.80-1.71)
• Variable, depending on the day	42.4	1.37 (1.02-1.84)*	24.5	1.66 (1.12-2.46)*
Marital status				
• Single	30.9	1	22.6	1
• Married or cohabiting	35.4	1.42 (1.13-1.77)**	15.3	0.84 (0.63-1.12)
• Widowed	38.1	1.83 (0.73-4.61)	24.3	1.74 (0.75-4.01)
• Separated/divorced	42.3	2.19 (1.38-3.46)**	18.0	1.12 (0.69-1.84)
Number of children				
• None	32.7	1	20.7	1
• One	34.0	1.01 (0.81-1.25)	15.4	0.85 (0.63-1.16)
• Two or more	37.8	1.25 (1.02-1.55)*	14.3	0.82 (0.60-1.13)
Weekly hours of domestic work				
• < 10 hours	34.7	1	22.1	1
• 10-20 hours	32.7	0.87 (0.73-1.02)	17.2	0.84 (0.65-1.09)
• >20 hours	37.4	1.09 (0.82-1.46)	14.1	0.71 (0.51-0.99)*
Age (per every 10 years)	-	0.83 (0.77-0.90)***	-	0.88 (0.77-0.99)*
Social class				
• I-II (more privileged)	35.9	1	17.8	1
• III	33.3	0.93 (0.75-1.17)	13.9	0.74 (0.56-0.99)*
• IV-V (manual workers)	34.2	1.01 (0.83-1.21)	20.2	1.25 (0.96-1.62)

Note: Representative sample of salaried workers of Catalonia (Spain) aged 16-64, working up to 60 hours.

Table 3 shows factors associated with working 51-60 hours as compared with working 30-40 hours, by gender. In both sexes, an association with variable shifts depending on the day was found. Additionally, among men, working 51-60 hours a week was also related to being married or cohabiting (aOR=1.55, 95% CI=1.05-2.29) and being separated or divorced

(aOR=2.33, 95% CI=1.09-4.97). No association with number of children living at home was found in either sex.

**Table 3. Factors associated with working 51-60 hours a week compared with working the standard number of hours (30-40 hours). Adjusted odds ratios (aOR) and 95% confidence intervals (CI). Catalonia Health Survey, 2006.**

	Men (n=2584)		Women (n=2190)	
	%	aOR (95% CI)	%	aOR (95% CI)
Type of contract				
• Permanent	11.9	1	3.1	1
• Fixed-term temporary contract	9.6	0.76 (0.50-1.14)	4.5	1.35 (0.70-2.59)
• Non-fixed term temporary contract	12.0	1.05 (0.60-1.81)	3.9	1.30 (0.41-4.15)
Shift type				
• Day	10.3	1	2.9	1
• Night	20.2	1.81 (1.03-3.19)*	5.1	1.88 (0.47-7.63)
• Shifts	10.1	0.95 (0.62-1.44)	3.9	1.06 (0.44-2.59)
• Variable, depending on the day	26.5	3.21 (2.17-4.76)***	8.8	3.42 (1.72-6.79)***
Marital status				
• Single	9.1	1	4.4	1
• Married or cohabiting	12.5	1.55 (1.05-2.29)*	2.7	0.76 (0.40-1.46)
• Widowed	18.8	2.72 (0.71-10.50)	3.4	0.39 (0.03-5.47)
• Separated/divorced	16.4	2.33 (1.09-4.97)*	4.9	1.04 (0.38-2.89)
Number of children				
• None	10.7	1	4.1	1
• One	13.1	1.07 (0.75-1.53)	2.7	0.69 (0.34-1.40)
• Two or more	12.1	1.00 (0.70-1.44)	2.6	0.74 (0.37-1.51)
Weekly hours of domestic work				
• < 10 hours	12.1	1	4.6	1
• 10-20 hours	9.3	0.71 (0.52-0.96)	3.2	0.69 (0.38-1.24)
• >20 hours	15.8	1.33 (0.85-2.08)	2.1	0.41 (0.19-0.92)*
Age (per every 10 years)	-	0.90 (0.79-1.03)	-	1.24 (0.95-1.62)
Social class				
• I-II (more privileged)	10.8	1	3.2	1
• III	9.7	0.98 (0.65-1.49)	1.9	0.62 (0.30-1.29)
• IV-V (manual workers)	12.5	1.30 (0.93-1.83)	4.9	1.59 (0.88-2.88)

Note: Representative sample of salaried workers of Catalonia (Spain) aged 16-64, working up to 60 hours.

### Association between long workhours and health

Table 4 shows the association between health outcomes and working hours. The relationship of long workhours with health and health related behaviours was much more consistent

among men. In males, working 51-60 hours a week was associated with six out of the seven outcomes analysed. Moreover, a gradient from standard working hours to 51-60 hours a week was found for the six outcomes.

**Table 4. Association between number of working hours, health and health-related behaviours by gender. Adjusted odds ratios (aOR) and 95% confidence intervals (CI). Catalonia Health Survey, 2006.**

	Poor self-perceived health status		Poor mental health status		Self-reported hypertension		Job dissatisfaction		Smoking		No leisure-time physical activity		Daily number of hours slept ≤6	
	%	aOR (95% CI)	%	aOR (95% CI)	%	aOR (95% CI)	%	aOR (95% CI)	%	aOR (95% CI)	%	aOR (95% CI)	%	aOR (95% CI)
<b>Men</b>														
Number of hours of paid work a week														
• 30-40 hours	9.5	1	4.8	1	11.4	1	11.2	1	33.4	1	5.5	1	25.4	1
• <30 hours	9.7	1.28 (0.70-2.35)	5.8	1.24 (0.62-2.45)	10.8	1.69 (0.99-2.91)	11.6	1.07 (0.64-1.78)	29.5	0.78 (0.54-1.11)	6.4	1.57 (0.80-3.05)	25.0	1.06 (0.73-1.55)
• 41-50 hours	8.6	0.96 (0.75-1.24)	5.7	1.24 (0.91-1.71)	12.4	1.19 (0.95-1.50)	15.3	1.52 (1.23-1.87)***	35.1	1.11 (0.95-1.29)	9.0	1.73 (1.31-2.27)***	30.6	1.30 (1.11-1.52)**
• 51-60 hours	13.4	1.43 (0.98-2.10)	8.8	2.06 (1.31-3.24)**	16.1	1.60 (1.12-2.29)*	20.5	2.05 (1.49-2.82)***	39.6	1.33 (1.03-1.72)*	12.8	2.43 (1.64-3.60)***	34.1	1.42 (1.09-1.85)**
<b>Women</b>														
Number of hours of paid work a week														
• 30-40 hours	15.0	1	13.4	1	9.3	1	12.8	1	28.8	1	7.3	1	26.6	1
• <30 hours	19.7	1.27 (0.97-1.68)	10.3	0.67 (0.48-0.93)*	8.3	0.81 (0.55-1.19)	13.1	0.95 (0.70-1.29)	28.3	0.97 (0.77-1.23)	6.4	0.85 (0.56-1.30)	23.9	0.83 (0.65-1.06)
• 41-50 hours	14.5	1.02 (0.75-1.39)	13.4	0.99 (0.73-1.35)	6.1	0.66 (0.43-1.03)	17.7	1.40 (1.06-1.85)*	26.7	0.84 (0.66-1.06)	9.6	1.38 (0.96-1.98)	25.7	1.00 (0.78-1.28)
• 51-60 hours	21.1	1.38 (0.74-2.55)	18.3	1.43 (0.77-2.65)	9.6	1.06 (0.46-2.46)	20.8	1.53 (0.84-2.79)	47.2	2.27 (1.39-3.70)**	9.7	1.53 (0.69-3.39)	42.5	2.21 (1.34-3.63)**

Note: Odds ratios are adjusted for type of contract, shift type, occupational social class, age, marital status, number of children living at home and number of hours of domestic work.

Note: Representative sample of salaried workers of Catalonia (Spain) aged 16-64, working up to 60 hours.

In both sexes, working 41-50 hours a week was associated with job dissatisfaction (aOR=1.52, 95% CI=1.23-1.87 for men and aOR=1.40, 95% CI=1.06-1.85 for women). Additionally, among men it was related to being sedentary during leisure time (aOR=1.73, 95% CI=1.31-2.27) and to sleeping 6 hours or less a day (aOR=1.30, 95% CI=1.11-1.52).

In both sexes, people working 51-60 hours a week were more likely to smoke (aOR=1.33, 95% CI=1.03-1.72 for men and aOR=2.27, 95% CI=1.39-3.70 for women) and to sleep 6 hours or less a day (aOR=1.42, 95% CI=1.09-1.85 for men and aOR=2.21, 95% CI=1.34-3.63) for women. Additionally, men working 51-60 hours a week were more likely to report poor mental health status (aOR=2.06, 95% CI=1.31-3.24), self-reported hypertension (aOR=1.60, 95% CI=1.12-2.29), job dissatisfaction (aOR=2.05, 95% CI=1.49-2.82) and no leisure-time physical activity (aOR=2.43, 95% CI=1.64-3.60).

## **DISCUSSION**

This study of representative data from an Spanish region adds to the growing body of evidence indicating that long working hours can substantially increase the risk of several poor health outcomes. Unlike other studies, our investigation has the advantage of covering a large variety of jobs, and overcoming many limitations of earlier research, for example by using a large sample and controlling for the potential confounding effect of age and a variety of job and family characteristics as well as by adopting a gender perspective.

The present study produced three main findings. First, factors associated with long workhours differed by gender. Second, among males there was a consistent association of long working hours with six of the seven health indicators analysed. Third, a notable result of our analysis

was the detection of a dose-response relationship among men, from a standard number of hours to 51-60 hours a week for these six health indicators.

As has been mentioned before, results of studies about long working hours and health status are contradictory. This is the case for the seven indicators analysed in this study. For example, whereas some authors have found a positive relationship between long working hours and poor general health status,<sup>32</sup> others have not.<sup>5 33</sup> However, whereas some authors have reported a positive association with depression,<sup>5</sup> others have not observed any relationship.<sup>34</sup> Findings about hypertension are also contradictory. Whereas some studies have reported a positive relationship,<sup>33 35</sup> others have found no association<sup>11 12</sup> and, even, a negative relationship has also been observed.<sup>36</sup> As in the present study, earlier research has found an association between long working hours and job dissatisfaction.<sup>33 37</sup> Whilst some studies have observed a positive relationship between long working hours and smoking,<sup>33 38</sup> others have not found it.<sup>7 39 40</sup> Although a positive association has been reported between extended hours and lack of physical activity during leisure time,<sup>33</sup> other studies have not observed any relationship.<sup>7 39 41</sup> Finally, shortage of sleep is the most consistent finding in the relationship between long working hours and health status.<sup>4 33 36 42</sup> Consistently, in our study, working 51-60 hours was associated with sleeping 6 hours or less a day in both sexes.

Therefore, the consistent association of extended workhours with a variety of health indicators among men is the main finding of this study. Gender differences in the association between long workhours and health outcomes is an interesting observation that can provide some clues for understanding the mechanisms that underlie the relationship between long working hours and health.

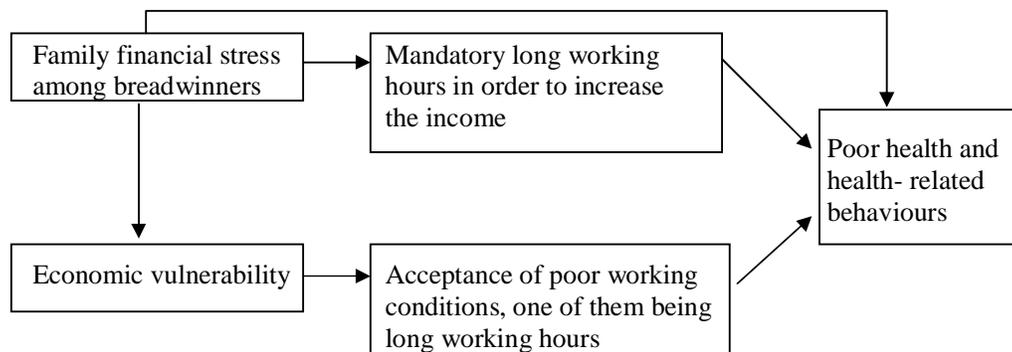
Whereas among women, working 41-50 hours was only associated with one health outcome, among men it was associated with 3. Moreover, working 51-60 hours was positively related to six out of the seven health outcomes analysed among males but with only two among females. Additionally, a gradient was found among men. It can be argued that the more consistent association of working 51-60 hours a week with health outcomes among males could be explained by an insufficient statistical power among women due to the low number of females working this schedule. However, when new logistic regression models were fitted with a single category of long workhours, working 41-60 hours a week was associated with all the outcomes except self-perceived health status among men but only with job dissatisfaction among women (*results not shown*).

It has been suggested that the relationship between workhours and ill health could be mediated by stress in that long hours act both directly as a stressor increasing the demands on those who attempt to maintain performance levels in the face of increasing fatigue and indirectly by increasing the time that a worker is exposed to other sources of workplace stress.<sup>243</sup> It has also been suggested that long working hours can be one indicator of a global poor psychosocial work environment among vulnerable workers.<sup>33</sup> Finally, the importance of choice in determining a person's response to long hours has being also pointed out.<sup>33 37 44 45</sup>

Therefore, there are several factors than can mediate in the relationship between long working hours and health status, some of them having a positive effect on health and others being negative. The results of our study among males suggest that there should be a strong and consistent factor that explains such a consistent association between long work hours and health status, that could be marital status. In this study, compared with males working 30-40 hours a week, those working both 41-50 hours and 51-60 hours were consistently more likely

to be married or cohabiting and separated or divorced, whereas no association with marital status was found among women. This finding suggests a possible relationship between long working hours and family financial stress among men, since they traditionally assume the role of family breadwinner. The obligatory nature of working long hours due to family financial stress among people who have the breadwinner role could explain the relationship between long working hours and poor health outcomes found in the subsample of males. Pressure to work long hours in order to increase the income and/or acceptance of poor working conditions, one of them being long working hours, due to fear of job loss in a situation of economic vulnerability, can be some of the reasons that explain the consistent pattern of association of long working hours with several health outcomes among men (figure 1).

**Figure 1. Proposed model for explaining the mechanism of the relationship between long working hours and health in this study.**



Our interpretation about overtime related to the need of increasing the income among men is supported by a study based on the 5<sup>th</sup> Spanish Working Conditions Survey that reported that receiving an economic compensation for overtime was significantly more frequent among men (60.1% versus 34.4%).<sup>46</sup> This hypothesis is also supported by the consistent association between working long hours and job dissatisfaction and the gradient found among males, whereas among women the association existed only for those working 41-50 hours. This interpretation about the importance of the mandatory nature of long working hours is also

consistent with the study of Van der Hulst et al.<sup>47</sup> that concluded that even a limited number of hours of involuntary overtime is associated with adverse mental health in low reward situations. Nakanishi et al.<sup>36</sup> reported a negative association between long working hours and hypertension among male white collar workers. In that study, architects or research workers did more overtime than clerks, and being an architect or a research worker (versus being a clerk) was negatively associated with blood pressure. The authors related this finding to the non mandatory nature of long working hours in this highly qualified group. As architects or research workers who work overtime might be especially competitive, or may particularly enjoy their work, they may not feel working long hours as job strain or stress.<sup>40</sup>

Our findings are consistent with those of Artazcoz et al.<sup>33</sup> that observed a positive relationship between long working hours and a variety of health outcomes only among females, among whom working long hours was associated with being separated or divorced, whilst among males there was no relationship with marital status. They are also consistent with a study showing a relationship between financial stress and risk of acute myocardial infarction among men but not among women.<sup>48</sup> It should be taken into account that between 2002 and 2005, in Spain, financial stress among families has significantly increased. For example, whereas in 2002 the percentage of household units with a ratio between debt and income higher than 3 was 3.4%, in 2005 it was 9.5%.<sup>49</sup> In Spain financial stress is closely related to the high increase in housing prices over the last decade. This situation is likely to be common in other developed countries. According to a study about 17 industrialised economies between 1970 and 2003, most of the countries experienced a house price boom after the mid-1990s. During this period, housing price growth was particularly strong in Ireland, the Netherlands and the United Kingdom followed closely by Australia, Spain and a number of Nordic countries, where the pace of growth was accelerated in more recent years.<sup>50</sup> Additionally, it should be

taken into account that Spain has the highest home ownership rate in Europe. Unfortunately, studies about financial stress and health are still scarce.

Self-perceived health status was the only health indicator not related to long working hours either in men or women. It seems that long workhours would be primarily related to psychosocial health conditions rather than with pain or physical limitations which would be likely to prevent them from working long hours. Actually, whereas no differences in the prevalence of long-standing limiting illness by working hours were found among women, among men the prevalence of **long-standing limiting illness** was 14.8% among those working part-time, 8.1% among those working 30-40 hours a week, and 7,4% among those working 41-50 or 51-60 hours a week.

### **Limitations**

This study can be limited by its cross-sectional design. However, reverse causation, whereby long working hours would not lead to poor health status and health-related behaviours, but rather the opposite, in other words, that people with poor health status and health-related behaviours would be more likely to work more than 40 hours a week, does not seem plausible. Besides data about **long-standing limiting illness** that support this hypothesis, whereas no differences in the prevalence of sickness leaves longer than 3 months by working hours were found among women (n=99), among men (n=53) the prevalence decreased with increasing working hours (4.5% among males working part-time, 1.4% among those working 30-40 hours, 0.9% among those working 41-50 hours and 0.3% among those working 51-60 hours). Therefore, health problems associated with long working hours in this study are primarily health conditions and behaviours that have often been related to stress or to lack of time for oneself.

It can be argued that there should be differences in the association between long working hours and health status by social class. Yet, multiple logistic regressions models additionally separated for manual and non-manual workers were fitted and the patterns of associations were similar (*results not shown*). It should be taken into account that between 2001 and 2005, the proportion of Spanish families with a housing debt increased from 21.6% to 26.1%. However, there was not such increase in households in the lowest two deciles of income. Moreover, the percentage of families with this kind of debt was higher among families with higher income.<sup>49</sup> These facts could explain the lack of interaction between long working hours and social class.

Although we have hypothesized that gender differences in the relationship between long working hours and poor health outcomes can be related to the mandatory nature of working long hours related to family financial stress among males, and have provided many arguments supporting this hypothesis, no specific questions about these issues were collected in the survey. Further research should be carried out in order to confirm this hypothesis.

## **Conclusions**

As far as we know, this is the first study in reporting such a consistent association between moderately long workhours and a variety of health indicators and health-related behaviours. Present competition from countries with low wages and low social costs seems at present to influence working hours to start to increase again.<sup>17</sup> However, our findings suggest that even moderately long work hours may act as a risk factor for health mainly when it is involuntary, for example because of family financial stress among breadwinners as seems to be the case in this study. Accordingly, policies most fruitful for improving workers' health should focus on reducing long working hours when it is mandatory and harmful.

### **What is already known on this subject**

- In the last years several studies have found an association between long working hours and different health indicators.
- However, the number of studies concerning the different areas of health is still low and the results are often contradictory. The inconsistent findings can be related to several methodological shortcomings of previous research, including small sample sizes or unique industry specific circumstances. Moreover, most studies have focused on very long working hours but little is known about moderately long workhours.

### **What this paper adds**

- As far as we know, this is the first study based on a large representative sample of the working population that shows such a consistent association between moderately long working hours and a variety of health indicators.
- A notable result of our analysis is the detection of a systematic dose-response relationship between long working hours and health and health-related behaviours among men from an standard number of hours to 51-60 hours a week.
- The consistent association of long working hours with six out of seven health indicators among men could be explained by their role of family breadwinners that in situations of family financial stress can be related to pressure to work long hours in order to increase the income and/or acceptance of poor working conditions, one of them being long working hours, due to fear of job loss.

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