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## **Health inequality and the use of time for workers in Europe**

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## 1. Introduction

In this paper, we analyze the relationship between health inequality and the time devoted to different activities by workers in six European countries. Despite previous literature has focused on the relationship between health status and labour market outcomes (Currie and Madrian; 1999; Au et al., 2005; Disney et al., 2006; Barnay, 2010; Jones et al., 2010), little is known about the relationship between health and non-labour market outcomes, which includes time devoted to household production and leisure. The analysis of other uses of time is relevant for several reasons. Time is a crucial factor in well-being (Kahneman et al., 2004; Kahneman and Krueger, 2006; Krueger, 2007; Stiglitz et al., 2009) and its scarcity may lead to problems to reconcile work and family spheres in an altruistic context (Hochschild, 1990; Schor, 1991, Gimenez-Nadal and Sevilla, 2011)<sup>1</sup>. Also, a great amount of time is allocated within the household in the form of household production (Becker, 1965), which has substitutes in the market as outsourcing activities that contribute to the Gross Domestic Product of the country. Considering Grossman's seminal work on the concept of health capital and the demand for health (Grossman, 1972a, 1972b), health can be considered a component of the stock of individual human capital that enters as a durable stock capital. Under this framework, investments in health increase the amount of time available to produce money earnings in the future. But time is also required to produce/maintain health and to obtain medical care. Thus, the analysis of non-market work time of workers, and its relationship with health inequalities, is relevant for policy issues.

To the best of our knowledge, only three studies have directly analyzed the relationship between health and time allocation decisions other than market work time. Podor and Halliday (2012) analyze the relationship between health and time allocation in the US, and find that better health is associated with large positive effects on home production, and large positive effects on market production, but less consumption of leisure. Gimenez-Nadal and Ortega (2013) analyze the relationship between health status and the time devoted to both market and non-market work in Spain, and find that better health is associated with an increase in the hours of market work and a decrease in the time devoted to non-market work. Gimenez-Nadal and Molina (2015) analyze the relationship between health status and the time devoted to different uses of time for a

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<sup>1</sup> See Molina (2013, 2014 and 2015) for special issues including recent evidence on altruistic behaviours at home in the context of reconciling work and family life.

sample of working and non-working individuals in six European countries, and find that a better perception of own health is associated with less time devoted to sleep, personal care, and non-market work, for both men and women, and with less time in leisure for men, while it is associated with more time in market work for both men and women. However, none of the previous studies have focused on its relationship (e.g., health status and time allocation decisions) for the specific case of workers, thus research on this topic is needed.

We contribute to the literature by analyzing the relationship between the self-reported health inequalities of workers and the time devoted to sleep, personal care, market work, non-market work, and leisure, in six European countries. We acknowledge there are several reasons that make our approach mainly descriptive, and we can talk about associations only and not about causality, as in Podor and Halliday (2012) and Gimenez-Nadal and Molina (2015). First, the use of self-reported health measures may introduce a source of endogeneity (e.g., reverse causality) that can affect the estimated relationship between health and time allocation decisions (Stern, 1989; Kerkhofs and Lindeboom, 1995; Dwyer and Mitchell, 1999; Kreider, 1999; Crossley and Kennedy, 2002; Benitez-Silva et al., 2004; Lindeboom and Van Doorslaer, 2004; Cai and Kalb, 2006; Lindeboom and Kerkhofs, 2009). Second, there might be unmeasured factors (e.g., unobserved heterogeneity) that may be related to both the responses to the self-assessed health measures and the different uses of time and bias the estimated relationships.

We examine time diary data for the following European countries: France (1998), Germany (2001), Italy (2002), the Netherlands (2000 and 2005), Spain (2002), and the United Kingdom (2000 and 2005). We offer descriptive evidence on the relationship between health and the time devoted to the different activities, together with estimated partial correlations, while controlling for demographic and household observable characteristics. In our estimated models we allow for correlations in the unobserved determinants of the activities by allowing the error terms in regressions to be jointly normally distributed, with no restrictions on the correlation (Seemingly Unrelated Regression, SURE). We find that a better perception of own health is associated with more time in market work activities during working days, while it is associated with less time in sleep and household production in Germany, Italy, the Netherlands and Spain, for both men and women. For the rest of uses of time, we find no clear cross-country

evidence. These results are consistent with the results obtained by Podor and Halliday (2012) for market work in the US, but not for non-market work and leisure. The results here are consistent with Gimenez-Nadal and Molina (2015) for market work, non-market work and sleep, but not for leisure.

In studying several countries, our work crucially adds to the study of the relationship between health inequality and time allocation decisions, including the most recent work by Podor and Halliday (2012), Gimenez-Nadal and Ortega (2013) and Gimenez-Nadal and Molina (2015). Specifically, we are able to improve our understanding of how better self-reported health status relates to market and non-market work activities, leisure, and personal care for workers in European countries. In contrast to the reported relationship between health and time allocation decisions in the US, we fail to find such relationships for home production and leisure in our six countries. The extent to which differences can be explained by cultural, institutional or demographic differences is discussed. Our paper also expands previous evidence on the relationship between health inequality and time workers spend in the labour market (Currie and Madrian; 1999; Au et al., 2005; Disney et al., 2006; Barnay, 2010; Jones et al., 2010). If results are similar across different countries, it is difficult that neither cultural nor institutional factors are shaping this relationship, shedding light on the possible channels through which health and labour market outcomes are related. Finally, we contribute to the field of health inequalities (Batana, 2010; Halliday, 2011 European Commission, 2013), a topic that has been largely ignored in the literature. The analysis of how differences in health status are related to daily lives of individuals proves relevant for policy issues.

The paper is organized as follows. Section 2 describes the data and the variables, and presents some descriptive evidence. Section 3 describes our empirical strategy, and Section 4 presents the main results. Section 5 sets out our main conclusions.

## **2. Data, variables and descriptive evidence**

In this paper we use the Multinational Time Use Survey (MTUS), an ex-post harmonized cross-time, cross-national, comparative time use database, coordinated by the Centre for Time Use Research at the University of Oxford.<sup>2</sup> It is constructed from

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<sup>2</sup> Information on the variables, and on how to access the data, is available on the MTUS website: <http://www.timeuse.org/mtus>. See Fisher et al. (2011) for a full description of the MTUS documentation. We use version W53 (accessed in October 2010) of the MTUS.

national randomly-sampled time-diary studies, with a common series of background variables, and total time spent in 41 activities (Gershuny, 2009). The MTUS provides us with information on individual time use, based on diary questionnaires in which individuals report their activities throughout the 24 hours of the day. The MTUS includes 41 activities, defined as the ‘primary’ or ‘main’ activity individuals were doing at the time of the interview. Thus, we are able to add up the time devoted to any activity of reference (e.g., paid work, leisure, TV watching) as ‘primary’ activity. The advantage of time-use surveys over stylized questions, such as those included in the data bases ECHP, BHPS, and SOEP (where respondents are asked how much time they have spent, for example, in the previous week, or normally spend each week, on market work or housework) is that diary-based estimates of time use are more reliable and accurate than estimates derived from direct questions (Juster and Stafford, 1985; Robinson and Godbey, 1997; Bianchi et al., 2000; Bonke, 2005; Yee-Kan, 2008).

Previous time use literature has shown that time allocation decisions of men and women differ, and that the same factors affect men and women differently (Kalenkoski et al., 2005; Aguiar and Hurst, 2007; Connelly and Kimmel, 2009; Gimenez-Nadal and Sevilla, 2012; Gimenez-Nadal and Molina, 2013). Furthermore, Schneider et al. (2012) find that the responses to health perception questions vary between male and female respondents. Therefore, we do the analysis separately by gender.

For the sake of comparison with existing studies (Aguiar and Hurst, 2007; Gimenez-Nadal and Sevilla, 2012) we restrict the sample used throughout our analysis to working individuals between the ages of 21 and 65 (inclusive). We include all individuals whose labour status is “working” according to the variable “empstat” included in the MTUS. However, despite we have information on whether the individuals worked part-/full-time, in many other cases we do not have information about the hours of work per week (11.14% of the observations), and thus our selection of sample includes both part-time and full-time workers. Also, this limitation in the part-/full-time status prevents us to control in our estimated models for the type of participation in the labour market. For the classification of time use activities, we follow previous literature (Burda et al., 2008; Gimenez-Nadal and Sevilla, 2012; Gimenez-Nadal and Molina, 2014,2015) and define the following time use categories: *sleep*, *personal care*, *market work*, *non-market work*, and *leisure*. Table A2 in the Appendix shows how the activities of the MTUS have been included in the various time use categories.

For the selection of countries, we select countries with information about individual health. To measure the health of individuals, we use the question about self-reported health status included in the survey, where respondents typically answer the question ‘how is your health in general?’ with five possible responses: “very poor health” (1), “poor health” (2), “fair health” (3), “good health” (4) and “very good health” (5). The CTUR team has recoded the categories to include the following values: “very poor/poor health” (1), “fair health” (2), “good health” (3) and “very good health” (4). The availability of information on health in the surveys leaves us with the following countries: France (1998), Germany (2001-02), Italy (2002-03), the Netherlands (2000 and 2005), Spain (2002-03) and the United Kingdom (2000 and 2005).<sup>3</sup> The information gathered by this question is known as the “Self-Assessed Health Status” (SAHS) measure.

Although SAHS measures are increasingly common in empirical research (Deaton and Paxson, 1998; Ettner, 1996; Podor and Halliday, 2012, Gimenez-Nadal and Ortega, 2013; Gimenez-Nadal and Molina, 2015), prior literature has identified a number of reasons why self-reported measures of health status may cause biases (e.g., Bound, 1991) as individuals may use health as a justification for leaving the labor force early. This phenomenon has been referred to as the “justification hypothesis”. When subjective health assessments measure leisure preferences rather than “true health capacity”, estimates of health effects will tend to be biased in the direction of poorer reported health driving retirement. Those who enjoy their work will downplay their health problems and work longer, while those who dislike their work may exaggerate health problems and retire sooner. Several studies have confirmed the endogeneity of self-reported health measures (Chirikos and Nestel, 1984; Anderson and Burkhauser, 1985; Bazzoli, 1985; Bound, 1991; Haveman et al. 1994; Gimenez-Nadal and Ortega, 2013).

Figures 1-A and 1-B show, for each country, the overall time devoted to the five time use activities, according to the health status of men and women, respectively. We average, for each country and health status, the time devoted to these activities. For instance, for France, we average the time devoted to sleep, personal care, market work, non-market work, and leisure, by men and women reporting “poor health”, “fair health”, “good health” and “very good health”. For the computation of average values, we use

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<sup>3</sup> Table 1 in Appendix shows the technical information of the surveys included in the study.

the demographic weights included in the survey.<sup>4</sup> We then (scatter) plot average time devoted to the reference activity (y-axis) on the health status of individuals (x-axis). We have also added a linear fit to see the extent to which scatters are distributed following a linear relationship. For both the scatter plot and the linear fit we must take into account that the number of workers reporting “very good” health may be different to the number of workers reporting “poor” health, for instance. In this sense, we need to weight each observation (average time in the reference activity/health status of workers) by the number of diaries included in the calculation of the average time. Thus, we include proportional weights in both the scatter plot and the linear fit, where the weights are built as the ratio of the number of diaries out of the total number of diaries. This explains why dots have different sizes, as the size of the dots is proportional to the proportion of diaries included in it.

In the case of sleep time, we observe a negative relationship (e.g., negative slope of the linear fit) between health status and the time devoted to this activity for both men and women, with the only exception being males in the UK as better health is associated with more time in sleep. Other uses of time that have a negative relationship with health status are personal care and non-market work, for both males and females and all countries, with the exceptions being for personal care of females in Spain and Italy where better health is associated with more time in this activity. In the case of market work time, we find for both men and women and all countries a positive relationship between health status and the time devoted to this activity. Finally, for the case of leisure, we find mixed evidence, and we cannot extract a clear pattern across countries.

These graphs also allow us to analyze cross-country differences in the amount of time devoted to the different activities. In the case of men, the highest time devoted to sleep is found in France, the Netherlands and Spain, while the lowest time is found in Germany. For personal care, males in Italy devote the highest time to these activities, followed by Germany and Spain, while the lowest times are found in the Netherlands and the UK. Regarding time in the labor market, there are few differences as most countries have average values around 7 hours per day, although the highest time to these activities is found in Italy and the lowest time in Germany. Considering non-market

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<sup>4</sup> These weights (PROPWT) are computed to take into account the distribution of the population and days of the week, and thus all the days of the week are equally represented in the sample. To promote consistency among the datasets, and to prevent surveys from countries with larger populations swamping the surveys from countries with smaller populations, original survey weights are deflated in the computation of PROPWT. More information on how weights are computed can be found in <http://www.timeuse.org/sites/ctur/files/858/mtus-user-guide-r6-july-2013.pdf>

work, we can define 2 groups of countries: Germany, the UK and the Netherlands, where males devoted around 2.5 hours per day to these activities, and Italy, Spain and France where males devote around 1.5 hours per day to these activities. Finally, in the case of leisure time, the highest time devoted to this activity is found for males in the UK, while the lowest time is found in Italy and Spain. All these cross-country differences are consistent with previous studies (Gimenez-Nadal and Sevilla, 2012).

In the case of women, we observe a larger cross-country dispersion in the different uses of time. Regarding the time devoted to sleep, the highest amount of time devoted to sleep is found in France, followed by the Netherlands and the UK. The lowest time devoted to sleep is found in Italy and Germany. Considering the time devoted to sleep, the highest time is found in Italy and Germany, while the lowest time is found in the UK, followed by the Netherlands. For market work, we can group countries in 2 groups: the group of Italy, France, and Spain, where female workers devote around 5 hours per day to market work activities, and the group of the UK, the Netherlands and Germany where female workers devote around 4 hours per day to these activities. If we now look at non-market work activities, the highest amounts are found in Italy and Germany, followed by Spain, while the lowest amount of time devoted to these activities is found in France and the UK. Finally, for leisure time, we can group the countries again in 2 groups, the group of the Netherlands, Germany and the UK, where female workers have around 5.25 hours per day to leisure, and the group of Italy, Spain and France where women devote around 4 hours per day to leisure. These cross-country differences in the different activities are consistent with Gimenez-Nadal and Sevilla (2012).

If we compare workers according to their gender, we find that men devote comparatively more time to market work activities, while women devote comparatively more time to non-market work activities, consistent with previous evidence (Gimenez-Nadal and Sevilla, 2012). Additionally, we find that women in Spain and Italy have comparatively less leisure time their female counterparts in other countries, and than men in general. This is consistent with previous evidence showing cross-country differences in social norms regarding the gender distribution of total work, defined as the sum of market and non-market work time (Burda et al., 2012). According to this evidence, Mediterranean countries have entrenched gender norms where women are mostly responsible of housework activities (Sevilla, 2010; Gimenez-Nadal et al., 2012), making women in these countries bear the burden of household chores. Thus, women in

these countries add to their labor market responsibilities their household responsibilities, which reduces the amount of leisure. This makes women suffer from a “second burden” or a “second shift”, and where previous evidence that are specially working women with children who have less leisure time (Gimenez-Nadal and Sevilla, 2011).

Tables 1-A and 1-B shows for each country, gender and self-reported health status the time devoted to the five time use activities, the difference in the time devoted to the reference activity between individuals reporting “very good health” and “poor health”, and the p-value of the difference. A positive value of the difference indicates that individuals who report having “poor health” devote less time to the reference activity compared to individuals with “very good health”. Negative values of the difference indicate that individuals who report having “poor health” report more time spent in the reference activity, compared to individuals with “very good health”. A p-value lower than .05 indicates that the difference between individuals reporting “poor health” and “very good health” in the overall time devoted to the reference activity is statistically significant at standard levels. Despite Figures 1-A and 1-B show a gradient between health status and the uses of time, we need to test whether such differences are statistically significant.

We observe clear patterns for the relationship between health status and the time devoted market work activities in all countries, while the evidence is mixed for the rest of activities. Regarding market work activities, we find that the difference in the daily hours between men reporting “poor health” and those reporting “very good health” are 1.459, 1.044, 2.020, 5.691, 1.628 and 1.976 hours per day in France, Germany, Italy, the Netherlands, Spain, and the United Kingdom, respectively, while the differences for women are 2.582, 1.014, 0.953, 2.510, 1.747 and 2.119, respectively. Descriptive evidence shows a negative relationship between bad health and the daily hours devoted to market work activities. In this sense, this relationship does not affect only to the labour force participation (e.g., lower participation in the labor market for those who report having bad health) but also to the number of hours of work for those who participate.

For the hours per day devoted to sleep, we find differences in the daily hours devote to this activity between men reporting “poor health” and those reporting “very good health” in France (-0.990), Italy (-0.688), the Netherlands (-0.972) and Spain (-0.688), differences for women in France (-0.878), Italy (-0.676), the Netherlands (-1.266) and

Spain (-0.526). Regarding personal care, we find differences in the daily hours between men reporting “poor health” and those reporting “very good health” in France (-0.277), Italy (-0.308) and Spain (-0.209) and differences for women in France (-0.519), Germany (-0.200) and the United Kingdom (-0.275) while women in Italy with “poor health” devote more time to this activity (0.2.39) than those reporting “very good health”.

If we focus on non-market work, we find differences in the daily hours devote to this activity between men reporting “poor health” and those reporting “very good health” in Italy (-0.552), the Netherlands (-3.006), Spain (-0.384) and the UK (-0.534), while for women these differences are found in Germany (-0.410), Italy (-1.063), Spain (-1.125) and the UK (-0.671). For leisure, the evidence is mixed and while we find differences in the daily hours devote to this activity between men reporting “poor health” and those reporting “very good health” for men in Germany (-0.764), the Netherlands (-2.007) and the UK (-1.285), for women we find a negative difference for the UK (-0.972) and a positive one for Italy (0.559).

Thus, while we find consistent cross-country evidence on the negative relationship between bad health and daily work hours, for the rest of activities the evidence is far from being robust. However, here demographic factor may condition the time devoted to the different activities, and thus in next Section we estimate models to control for the observed heterogeneity of individuals.

### **3. Empirical strategy**

We estimate lineal regressions on the time devoted to *sleep*, *personal care*, *market work*, *non-market work*, and *leisure* (although results using the Tobit model are consistent and available upon request).<sup>5</sup> Furthermore, we take into account that the time individuals spend in any activity (e.g., market work) cannot be devoted to any of the other activities. The time constraint binds at 24 hours per day, and individuals must decide how much time they devote to the different activities, which leads to substitution or complementarity effects between groups of activities. Thus, we need to take into account that the more time individuals devote to any one activity, the less time is

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<sup>5</sup> There can be some controversy regarding the selection of alternative models, such as that of Tobin (1958), given the high proportion of non-participation in some activities such as non-market work. Foster and Kalenkoski (2013) compare the use of Tobit and linear models in the analysis of the time devoted to childcare activities, finding that the qualitative conclusions are similar for the two estimation methods

available for the others. However, we cannot use individual time in any specific activity as an explanatory variable of other uses of time, since it would lead to endogeneity problems, and for this reason we estimate a Seemingly Unrelated Regression (SUR) system on the time devoted to *sleep, personal care, market work, non-market work, and leisure*.

The statistical model is as follows. For a given individual ‘i’ and country ‘j’ (j=1,2...5), let  $S_{ij}$ ,  $PC_{ij}$ ,  $MW_{ij}$ ,  $NMW_{ij}$  and  $Leisure_{ij}$  represent the daily hours that the individual reports performing *sleep, personal care, market work, non-market work, and leisure*. Let  $X_{ij}$  be a vector of socio-demographic characteristics, and let  $\varepsilon_{sij}$ ,  $\varepsilon_{pcij}$ ,  $\varepsilon_{mwij}$ ,  $\varepsilon_{nmwij}$  and  $\varepsilon_{lij}$  be random variables that represent unmeasured factors. We estimate the following equations:

$$S_{ij} = \alpha_s + \beta_{s1}SAHS_{ij} + \beta_{s2}X_{ij} + \alpha_s Day_{ij}^n + \delta_s Month_{ij}^k + \varepsilon_{sij} \quad (1)$$

$$PC_{ij} = \alpha_{pc} + \beta_{pc1}SAHS_{ij} + \beta_{pc2}X_{ij} + \alpha_{pc} Day_{ij}^n + \delta_{pc} Month_{ij}^k + \varepsilon_{pcij} \quad (2)$$

$$MW_{ij} = \alpha_{mw} + \beta_{mw1}SAHS_{ij} + \beta_{mw2}X_{ij} + \alpha_{mw} Day_{ij}^n + \delta_{mw} Month_{ij}^k + \varepsilon_{mwij} \quad (3)$$

$$NMW_{ij} = \alpha_{nmw} + \beta_{nmw1}SAHS_{ij} + \beta_{nmw2}X_{ij} + \alpha_{nmw} Day_{ij}^n + \delta_{nmw} Month_{ij}^k + \varepsilon_{nmwij} \quad (4)$$

$$L_{ij} = \alpha_l + \beta_{l1}SAHS_{ij} + \beta_{l2}X_{ij} + \alpha_l Day_{ij}^n + \delta_l Month_{ij}^k + \varepsilon_{lij} \quad (5)$$

where  $SAHS_{ij}$  is the variable indicating the self-reported health status of individual ‘i’ in country ‘j’,  $X_{ij}$  is a vector of personal and household characteristics,  $Day_{ij}^n$  is a vector of day-of-week dummy variables (ref.: Saturday, n=6), and  $Month_{ij}^k$  is a vector of month dummy variables (ref.: December, k=11). These dummy variables take value “1” if the diary of individual “i” in country “j” refers to the n-th day/k-th month, and “0” otherwise. Thus, reference diaries refer to Saturdays in December. In the case of the Netherlands, the survey was done during October only, and thus we do not include dummies to control for the month of the diary.

We allow for correlations in the unobserved determinants of the activities by allowing the error terms to be jointly normally distributed, with no restrictions on the correlation. This specification accounts for the time constraint that may require individuals to spend more time on one activity and, therefore, less time on another. We additionally assume that the error components are independent across individuals:

$$\begin{pmatrix} \varepsilon_{sij} \\ \varepsilon_{pcij} \\ \varepsilon_{nmwij} \\ \varepsilon_{nmwij} \\ \varepsilon_{lij} \end{pmatrix} \sim N \left( \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_{sij}^2 & \rho_{pcijsij} \sigma_{pcij} \sigma_{sij} & \rho_{mwijsij} \sigma_{nmwij} \sigma_{sij} & \rho_{nmwijsij} \sigma_{nmwij} \sigma_{sij} & \rho_{lijsij} \sigma_{lij} \sigma_{sij} \\ \rho_{sijpcij} \sigma_{sij} \sigma_{pcij} & \sigma_{pcij}^2 & \rho_{nmwijpcij} \sigma_{nmwij} \sigma_{pcij} & \rho_{nmwijpcij} \sigma_{nmwij} \sigma_{pcij} & \rho_{lijpcij} \sigma_{lij} \sigma_{pcij} \\ \rho_{sijnmwij} \sigma_{sij} \sigma_{nmwij} & \rho_{pcijnmwij} \sigma_{pcij} \sigma_{nmwij} & \sigma_{nmwij}^2 & \rho_{nmwijnmwij} \sigma_{nmwij} \sigma_{nmwij} & \rho_{lijnmwij} \sigma_{lij} \sigma_{nmwij} \\ \rho_{sijnmwij} \sigma_{sij} \sigma_{nmwij} & \rho_{pcijnmwij} \sigma_{pcij} \sigma_{nmwij} & \rho_{nmwijnmwij} \sigma_{nmwij} \sigma_{nmwij} & \sigma_{nmwij}^2 & \rho_{lijnmwij} \sigma_{lij} \sigma_{nmwij} \\ \rho_{sijlij} \sigma_{sij} \sigma_{lij} & \rho_{pcijlij} \sigma_{pcij} \sigma_{lij} & \rho_{mwijsij} \sigma_{nmwij} \sigma_{lij} & \rho_{nmwijsij} \sigma_{nmwij} \sigma_{lij} & \sigma_{lij}^2 \end{pmatrix} \right)$$

The vector  $X_{ij}$  includes personal and household characteristics (Hallberg and Klevmarken, 2003; Kalenkoski et al., 2005, 2009; Kimmel and Connelly, 2007; Connelly and Kimmel, 2009; Gimenez-Nadal and Molina, 2013), which are age and its square, secondary and university education, the number of children under 18 in the household, household size, whether the youngest child is under 5, whether the youngest child is 5-12, whether the youngest child is 13-17, and civil status (ref.: not in couple).<sup>6</sup>

Following Goryakin et al. (2013), as an alternative analysis we create the “good health” variable that takes value “1” if individuals reported “good” or “very good” health, and value “0” when individuals report “poor” and “fair” health, and include this dummy variable in Equations (1) to (5) as a measure of self-reported health. We transform the dependent variable to its log form, so that coefficients can be interpreted as follows: the dependent variable changes by 100\*(coefficient) percent for a one unit increase (i.e. changes from “poor health” to “fair health”, from “fair health” to “good health”, and from “good health” to “very good health”) in the independent variable, while all other variables in the model are held constant.

#### 4. Results

Tables 2-A and 2-B show the SAHS and good health coefficients obtained from estimating Equations (1) to (5) on the time devoted to sleep, personal care, market work, non-market work, and leisure, for men and women respectively.<sup>7</sup> Regarding results for men, we observe that in all countries, both the SAHS and the good health variables are associated with increases in the time devoted to market work, in most countries are negatively related with sleep and non-market work, while for leisure and personal care results are not robust across countries. These results are consistent with the results obtained by Podor and Halliday (2012) for market work and leisure in the US, but not

<sup>6</sup> We do not include the labour status of respondents, as it may lead to endogeneity problems, since the labour status of individuals probably influences the time devoted to all activities.

<sup>7</sup> We do not show the coefficients for other controls (age, education, children, day of the week); they are available upon request.

for non-market work, given that the authors find that better health is associated with large positive effects on home production.

In particular, and focusing on the SAHS variable, an increase of one category in the health status of men is associated with decreases in the time devoted to sleep of 1.7, 1.2, 0.6, 1.6, and 1.3 percent in France, Germany, Italy, the Netherlands, and Spain, increases in the time devoted to market work of 6.3, 3.7, 2.1, 11.4, 7.6 and 6.1 percent in France, Germany, Italy, the Netherlands, Spain and the UK, and decreases in the time devoted to non-market work of 2.1, 2.0, 7.1 and 2.5 in Germany, Italy, the Netherlands, and Spain. For the rest of time use activities, an increase of one category in the health status of men is associated with decreases in the time devoted to personal care of 1.4 and 2.5 percent in France and the Netherlands, and in the time devoted to leisure of 2.8 and 3.8 percent in the Netherlands and the UK. We observe that the strongest associations between health status and the time devoted to market and non-market work are found in the Netherlands and Spain.

Results for women are very similar than those of men, as we observe that in all countries both the SAHS and the good health variables are associated with decreases in the time devoted to sleep and increases in the time devoted to market work, and in the majority of countries there is a negative relationship between health status and non-market work time. Considering the time devoted to personal care and leisure, the cross-country evidence here is mixed. Again, these results are consistent with the results obtained by Podor and Halliday (2012) for market work and leisure in the US, but not for non-market work, given that the authors find that better health is associated with large positive effects on home production.

Focusing on the SAHS variable, we obtain that an increase of one category in the health status of women is associated with decreases in the time devoted to sleep of 1.8, 1.0, 0.9, 2.7, 1.0 and 1.3 percent in France, Germany, Italy, the Netherlands, Spain and the UK, increases in the time devoted to market work of 7.1, 5.1, 10.6, 6.2 and 8.5 percent in France, Germany, the Netherlands, Spain and the UK, and decreases in the time devoted to non-market work of 2.1, 3.1, 5.4 and 3.7 in Germany, Italy, the Netherlands, and Spain. For the rest of time use activities, an increase of one category in the health status of women is associated with decreases in the time devoted to personal care of 2.1, 1.6 and 2.0 in France, Germany and the Netherlands while associated with an increase of 1.5 percent in personal care in Italy, and with increases in the time

devoted to leisure of 2.8 percent in the Netherlands and the UK. We observe that the strongest associations between health.

## **5. Discussion**

Regarding the factors affecting the relationship between health status and time allocation decisions, differences in the healthcare system have been shown to have a significant effect running from health to the probability of employment (García-Gomez, 2011), with cross-country differences in Social Security arrangements helping to explain differences in the estimates for the effects of health shocks. But in our context we find robust cross-country evidence of the relationship between health status, on the one hand, and the time devoted to market work, sleep and non-market work, which may indicate other factors are also important in explaining such relationships and not the type of healthcare system only.

Another related factor may be working regulations. For instance, Barbieri and Cutuli (2015) find a detrimental effect of unbalanced passive and active labour market policies on inequality, while temporary employment, if compared with unemployment, may still play a role in reducing individual subsequent unemployment risks. In the current context, we have countries with large differences in labour market regulations, as labour markets are comparatively more regulated in Mediterranean countries such as Italy with strict rules concerning the hiring and firing of workers, and the types of employment arrangements permitted, which results in women in Italy participating less in the labour market (Del Boca, 2002). Also, the rates of temporary and full-time contracts differ by country (EUROSTAT, 2015). However, the fact that we find similar relationships between health status and the uses of time in the six analyzed countries, especially for the case of market work time of workers, may indicate that differences in labour market regulations play a limited role in explaining the relationship between health status and time inequality of European workers.

Another possible factor that may shape the relationship between health status and time allocation decisions is that of household gender roles. Gimenez-Nadal, Molina and Sevilla (2012) classifies a group of European countries according to the gender inequality in the time devoted to childcare activities, and while France and Germany are classified among the most egalitarian, Mediterranean countries such as Italy and Spain

are classified among the most inegalitarian, which may indicate that gender roles in those Mediterranean countries impose tougher household responsibilities to women in those countries compared to their female counterparts in other countries. Table 3 shows for 3 questions related to the work-life balance (e.g., I have come home from work too tired to do household jobs; It has been difficult to fulfil family responsibilities because of time spent on job; I have found it difficult to concentrate at work because of family responsibilities) the percentage of individuals that report to have problems several times a week, and we observe first that for while there are gender differences in Italy, Spain and the UK, where we find a higher proportion of women reporting having problems related to the work-life balance, the difference is much smaller in the other 3 countries. Thus, gender roles impose though household responsibilities to women in some countries, which may be related to both inequalities in health and the uses of time.

As we find similar results across the six analyzed countries, despite those countries have different institutions, healthcare and tax systems, regulations, and culture, our analysis may serve as a starting point for a better understanding of the relationship between health inequality, labour market outcomes, and daily life as measured by time allocation decisions.

## **6. Conclusions**

This paper analyzes the relationship between health status and time allocation decisions for workers in six European countries. Using the Multinational Time Use Study, we find that a better perception of own health is associated with less time devoted to sleep and non-market work, while it is associated with more time in market work. Despite our results are not causal as we cannot deal with endogeneity issues, our conclusions differ from those of Podor and Halliday (2012) for the US, which may indicate that the relationship between health and time allocation decisions of workers is country-specific.

Our paper will be of interest for economists and policymakers. To the extent that leisure time has value (Kahneman et al, 2004; Kahneman and Krueger, 2006; Krueger, 2007, Sevilla et al., 2012), the evidence presented in this paper provides a promising line of research for understanding cross-country differences in well-being. Additionally, since unhealthy people work less, and devote more time to personal care activities, our results help to explain a possible source of income inequality, both at the individual and the country level.

One limitation of our analysis is that our data is a cross-section of individuals, and it does not allow us to identify the effect of health net of both (permanent) individual heterogeneity in preferences and reverse causality. This is particularly important in our context, as health may be endogenous to time allocation decisions. Alternative datasets with a panel data structure, such as the British Household Panel Survey (BHPS), Panel Study of Income Dynamics (PSID), or the European Union Statistics on Income and Living Conditions (EU-SILC) where individual fixed-effects can be used to net out the effect from individual unobserved heterogeneity, become important at this stage of research. Despite they do not contain information for personal care and leisure, they contain information on market work and housework time, which would allow to compare and see the extent to which our results are affected by endogeneity issues. Given the previous literature on the relationship between health and labour outcomes, we argue that our results show an upper value of the positive relationship between good health and market work hours, while a lower limit for the relationship with personal care and non-market work.

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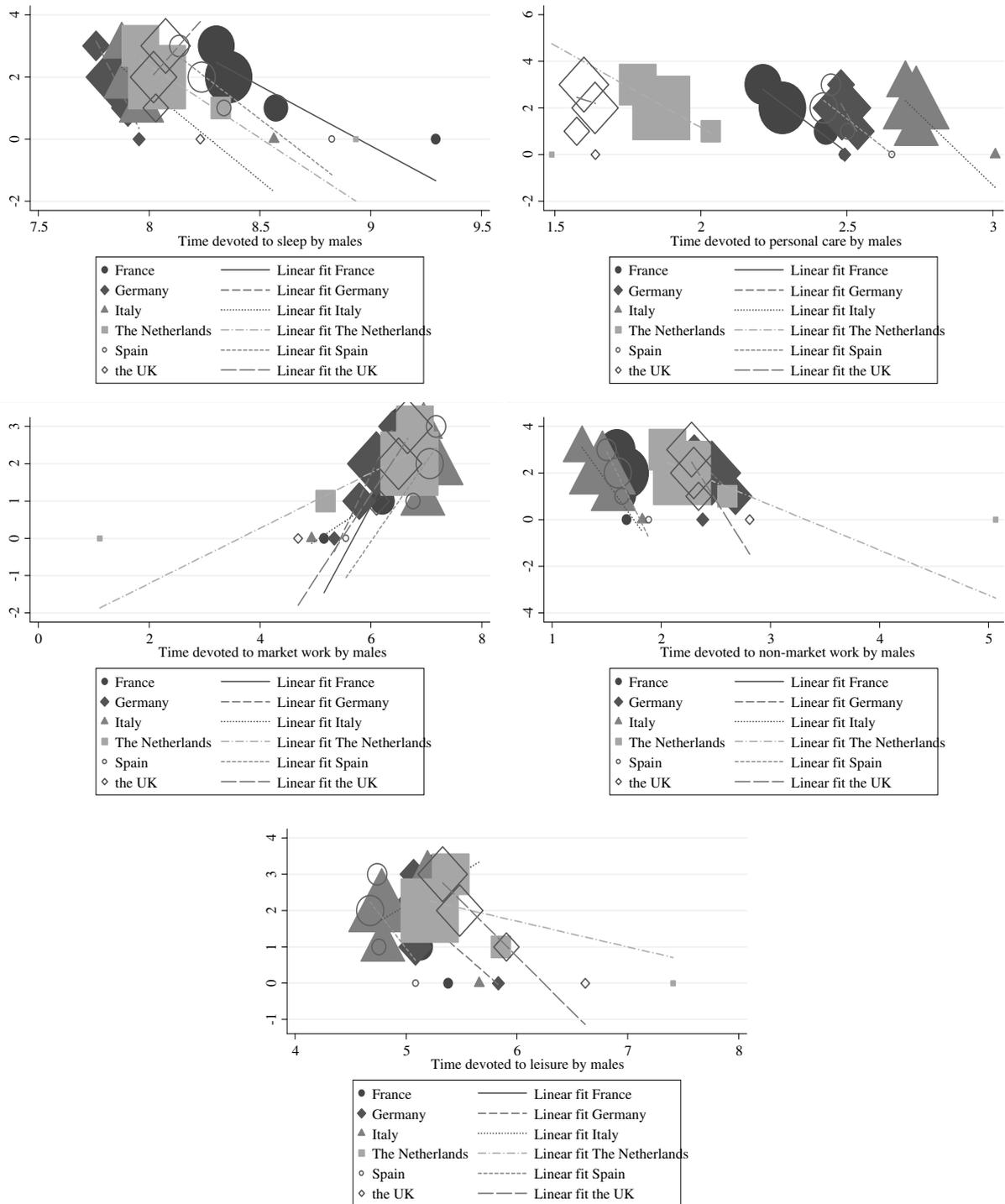
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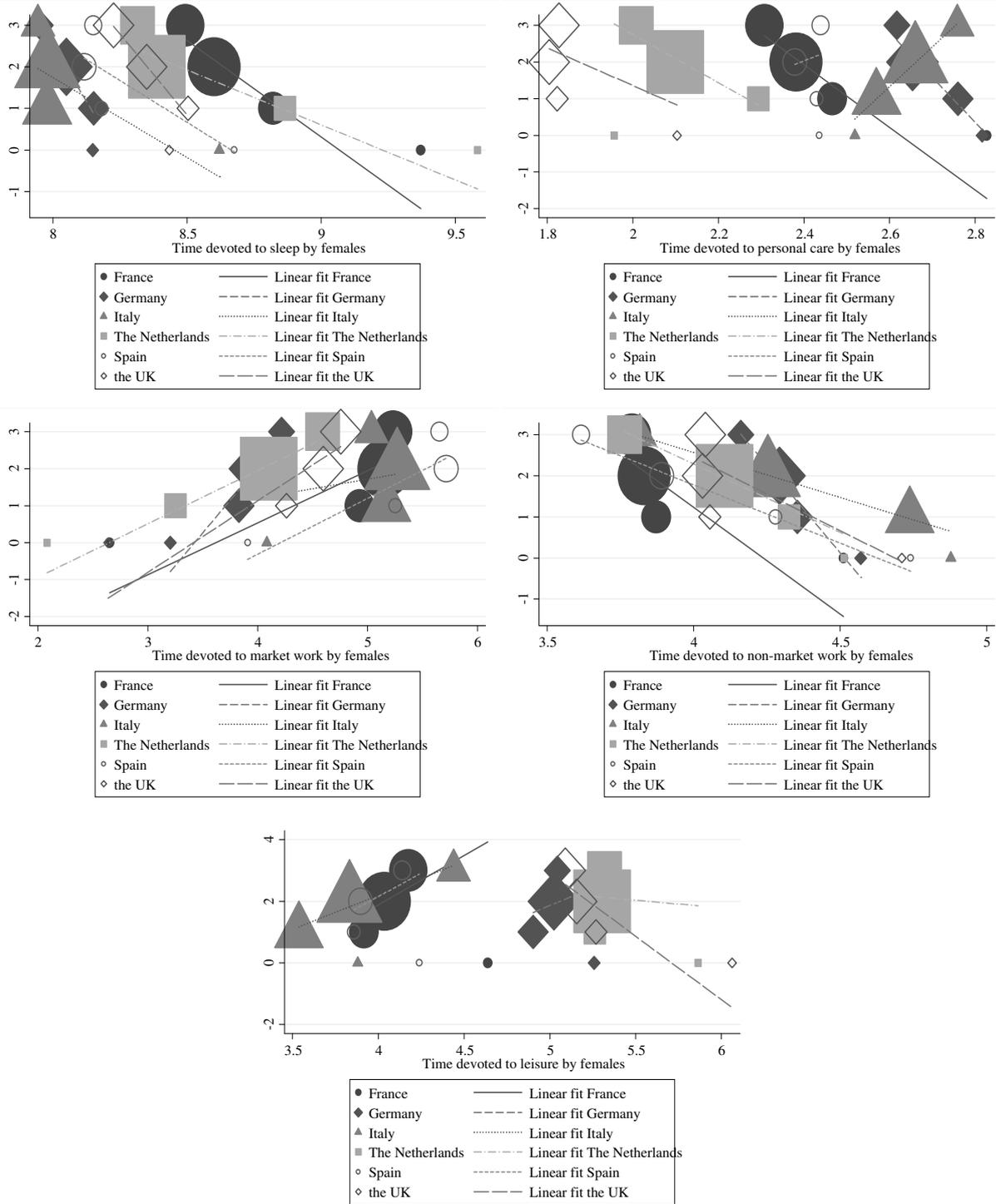
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**Figure 1-A. Time allocation and health status of respondents, males**



*Notes:* The sample is restricted to include part-/full-time male workers between the ages of 21 and 65 (inclusive) included in the Multinational Time Use Study (MTUS) from France, Germany, Italy, the Netherlands, Spain and the United Kingdom. *Time use activities* are measured in hours per day, see Table A2 for definitions of time-use categories.

**Figure 1-B. Time allocation and health status of respondents, females**



*Notes:* The sample is restricted to include part-/full-time female workers between the ages of 21 and 65 (inclusive) included in the Multinational Time Use Study (MTUS) from France, Germany, Italy, the Netherlands, Spain and the United Kingdom. *Time use activities* are measured in hours per day, see Table A2 for definitions of time-use categories.

**Table 1-A. Sum stats of time devoted to time use categories, by self-reported health status, males.**

		(1)	(2)	(3)	(4)	(5)
<b>Males</b>		<b>Sleep</b>	<b>Personal Care</b>	<b>Market work</b>	<b>Non-Market work</b>	<b>Leisure</b>
<i>France (N=3,922)</i>	<b>Poor health</b>	9.294	2.489	5.154	1.683	5.380
	<b>Fair Health</b>	8.573	2.429	6.210	1.658	5.131
	<b>Good Health</b>	8.359	2.279	6.492	1.670	5.199
	<b>Very Good Health</b>	8.304	2.212	6.613	1.594	5.277
	<b>Diff Very Good Health-Poor Health</b>	-0.990	-0.277	1.459	-0.089	-0.103
	<b>P-Value Difference</b>	(<0.01)	(0.05)	(0.01)	(0.70)	(0.81)
<i>Germany (N=8,920)</i>	<b>Poor health</b>	7.955	2.492	5.338	2.380	5.833
	<b>Fair Health</b>	7.905	2.537	5.791	2.679	5.085
	<b>Good Health</b>	7.845	2.483	6.098	2.463	5.106
	<b>Very Good Health</b>	7.760	2.479	6.382	2.304	5.069
	<b>Diff Very Good Health-Poor Health</b>	-0.194	-0.013	1.044	-0.076	-0.764
	<b>P-Value Difference</b>	(0.12)	(0.88)	(<0.01)	(0.65)	(<0.01)
<i>Italy (N=12,100)</i>	<b>Poor health</b>	8.563	3.008	4.930	1.827	5.660
	<b>Fair Health</b>	7.966	2.737	6.939	1.561	4.790
	<b>Good Health</b>	7.945	2.737	7.072	1.461	4.781
	<b>Very Good Health</b>	7.876	2.700	6.950	1.275	5.193
	<b>Diff Very Good Health-Poor Health</b>	-0.688	-0.308	2.020	-0.552	-0.467
	<b>P-Value Difference</b>	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(0.09)
<i>The Netherlands (N=6,305)</i>	<b>Poor health</b>	8.932	1.490	1.106	5.063	7.409
	<b>Fair Health</b>	8.323	2.034	5.181	2.607	5.854
	<b>Good Health</b>	8.036	1.865	6.697	2.190	5.213
	<b>Very Good Health</b>	7.960	1.783	6.797	2.057	5.402
	<b>Diff Very Good Health-Poor Health</b>	-0.972	0.294	5.691	-3.006	-2.007
	<b>P-Value Difference</b>	(0.01)	(0.20)	(<0.01)	(<0.01)	(0.01)
<i>Spain (N=11,467)</i>	<b>Poor health</b>	8.825	2.655	5.551	1.884	5.085
	<b>Fair Health</b>	8.338	2.502	6.765	1.640	4.755
	<b>Good Health</b>	8.237	2.420	7.063	1.604	4.676
	<b>Very Good Health</b>	8.136	2.445	7.179	1.500	4.739
	<b>Diff Very Good Health-Poor Health</b>	-0.688	-0.209	1.628	-0.384	-0.347
	<b>P-Value Difference</b>	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(0.07)
<i>The United Kingdom (N=5,329)</i>	<b>Poor health</b>	8.231	1.639	4.685	2.811	6.616
	<b>Fair Health</b>	8.029	1.575	6.103	2.343	5.906
	<b>Good Health</b>	8.020	1.637	6.501	2.297	5.484
	<b>Very Good Health</b>	8.075	1.600	6.661	2.277	5.331
	<b>Diff Very Good Health-Poor Health</b>	-0.156	-0.039	1.976	-0.534	-1.285
	<b>P-Value Difference</b>	(0.47)	(0.71)	(<0.01)	(0.07)	(<0.01)

*Notes:* Standard deviations in parenthesis. The sample is restricted to include part-/full-time male workers between the ages of 21 and 65 (inclusive) included in the Multinational Time Use Study (MTUS) from France, Germany, Italy, the Netherlands, Spain and the United Kingdom. Time use activities are measured in hours per day, see Table A2 for definitions of time-use categories. Diff Very Good Health-Poor Health indicates the difference in the time devoted to the reference time use activity between individuals reporting “very good health”, and individuals reporting “poor health”, p-value of such difference in parentheses.

**Table 1-B. Sum stats of time devoted to time use categories, by self-reported health status, females.**

		(1)	(2)	(3)	(4)	(5)
<b>Females</b>		<b>Sleep</b>	<b>Personal Care</b>	<b>Market work</b>	<b>Non-Market work</b>	<b>Leisure</b>
<i>France (N=3,362)</i>	<b>Poor health</b>	9.371	2.827	2.653	4.512	4.637
	<b>Fair Health</b>	8.820	2.466	4.926	3.872	3.916
	<b>Good Health</b>	8.601	2.382	5.150	3.831	4.035
	<b>Very Good Health</b>	8.493	2.308	5.235	3.790	4.175
	<b>Diff Very Good Health-Poor Health</b>	-0.878	-0.519	2.582	-0.722	-0.462
	<b>P-Value Difference</b>	(<0.01)	(<0.01)	(<0.01)	(0.06)	(0.26)
<i>Germany (N=8,701)</i>	<b>Poor health</b>	8.149	2.816	3.204	4.571	5.259
	<b>Fair Health</b>	8.151	2.759	3.829	4.353	4.903
	<b>Good Health</b>	8.051	2.654	3.974	4.293	5.023
	<b>Very Good Health</b>	7.953	2.617	4.218	4.161	5.044
	<b>Diff Very Good Health-Poor Health</b>	-0.196	-0.200	1.014	-0.410	-0.214
	<b>P-Value Difference</b>	(0.07)	(0.01)	(<0.01)	(0.02)	(0.23)
<i>Italy (N=8,110)</i>	<b>Poor health</b>	8.620	2.519	4.082	4.878	3.880
	<b>Fair Health</b>	7.979	2.570	5.171	4.738	3.537
	<b>Good Health</b>	7.979	2.660	5.270	4.254	3.831
	<b>Very Good Health</b>	7.944	2.758	5.035	3.816	4.439
	<b>Diff Very Good Health-Poor Health</b>	-0.676	0.239	0.953	-1.063	0.559
	<b>P-Value Difference</b>	(<0.01)	(0.02)	(0.02)	(<0.01)	(0.04)
<i>The Netherlands (N=6,737)</i>	<b>Poor health</b>	9.582	1.957	2.083	4.514	5.864
	<b>Fair Health</b>	8.864	2.293	3.253	4.326	5.262
	<b>Good Health</b>	8.387	2.099	4.101	4.106	5.306
	<b>Very Good Health</b>	8.316	2.008	4.593	3.764	5.319
	<b>Diff Very Good Health-Poor Health</b>	-1.266	0.051	2.510	-0.750	-0.545
	<b>P-Value Difference</b>	(<0.01)	(0.74)	(<0.01)	(0.08)	(0.22)
<i>Spain (N=7,927)</i>	<b>Poor health</b>	8.676	2.436	3.909	4.741	4.239
	<b>Fair Health</b>	8.181	2.429	5.252	4.280	3.856
	<b>Good Health</b>	8.117	2.379	5.717	3.891	3.896
	<b>Very Good Health</b>	8.150	2.439	5.656	3.616	4.139
	<b>Diff Very Good Health-Poor Health</b>	-0.526	0.003	1.747	-1.125	-0.100
	<b>P-Value Difference</b>	(<0.01)	(0.96)	(<0.01)	(<0.01)	(0.59)
<i>The United Kingdom (N=5,326)</i>	<b>Poor health</b>	8.434	2.103	2.638	4.711	6.062
	<b>Fair Health</b>	8.503	1.823	4.262	4.055	5.270
	<b>Good Health</b>	8.349	1.805	4.596	4.030	5.156
	<b>Very Good Health</b>	8.226	1.828	4.757	4.039	5.090
	<b>Diff Very Good Health-Poor Health</b>	-0.207	-0.275	2.119	-0.671	-0.972
	<b>P-Value Difference</b>	(0.23)	(<0.01)	(<0.01)	(0.02)	(<0.01)

*Notes:* Standard deviations in parenthesis. The sample is restricted to include part-/full-time male workers between the ages of 21 and 65 (inclusive) included in the Multinational Time Use Study (MTUS) from France, Germany, Italy, the Netherlands, Spain and the United Kingdom. Time use activities are measured in hours per day, see Table A2 for definitions of time-use categories. Diff Very Good Health-Poor Health indicates the difference in the time devoted to the reference time use activity between individuals reporting “very good health”, and individuals reporting “poor health”, p-value of such difference in parentheses.

**Table 2-A. Estimates of the effect of health status on various time use categories using MTUS data, males**

	(1) Sleep		(3) Personal Care		(5) Market work		(7) Non-Market work		(9) Leisure	
	SAHS	GOOD HEALTH	SAHS	GOOD HEALTH	SAHS	GOOD HEALTH	SAHS	GOOD HEALTH	SAHS	GOOD HEALTH
<b>Males</b>										
<i>France (N=3,922)</i>	-0.017*** (0.004)	-0.029*** (0.008)	-0.014* (0.007)	-0.036** (0.014)	0.063*** (0.020)	0.128*** (0.038)	-0.006 (0.014)	-0.011 (0.027)	-0.004 (0.012)	-0.008 (0.023)
<i>Germany (N=8,920)</i>	-0.012*** (0.003)	-0.013*** (0.005)	0.004 (0.005)	-0.002 (0.008)	0.037*** (0.013)	0.046** (0.021)	-0.021** (0.010)	-0.043*** (0.016)	-0.010 (0.008)	-0.002 (0.012)
<i>Italy (N=12,100)</i>	-0.006** (0.003)	-0.004 (0.004)	-0.003 (0.004)	0.002 (0.006)	0.021* (0.011)	0.035** (0.017)	-0.020** (0.008)	-0.024* (0.013)	0.009 (0.007)	-0.008 (0.010)
<i>The Netherlands (N=6,305)</i>	-0.016*** (0.004)	-0.034*** (0.009)	-0.025*** (0.007)	-0.049*** (0.016)	0.114*** (0.017)	0.336*** (0.036)	-0.071*** (0.014)	-0.177*** (0.029)	-0.028*** (0.011)	-0.098*** (0.022)
<i>Spain (N=11,467)</i>	-0.013*** (0.003)	-0.018*** (0.005)	-0.001 (0.003)	-0.011* (0.007)	0.076*** (0.011)	0.142*** (0.021)	-0.025*** (0.008)	-0.038** (0.016)	-0.008 (0.007)	-0.022* (0.014)
<i>The United Kingdom (N=5,329)</i>	-0.001 (0.004)	0.000 (0.008)	0.006 (0.006)	0.026** (0.013)	0.061*** (0.016)	0.135*** (0.035)	-0.018 (0.012)	-0.026 (0.026)	-0.038*** (0.010)	-0.071*** (0.020)

*Notes:* Robust standard errors in parenthesis. The sample is restricted to include part-/full-time male workers between the ages of 21 and 65 (inclusive) included in the Multinational Time Use Study (MTUS) from France, Germany, Italy, the Netherlands, Spain and the United Kingdom. Regressions include age and its square, secondary and university education, the number of children under 18 in the household, household size, whether the youngest child is under 5, whether the youngest child is 5-12, whether the youngest child is 13-17, civil status (ref.: not in couple), day-of-week dummies (ref.: Saturday) and month dummies (ref.: December).. *Time use activities* are measured in hours per day, see Table A2 for definitions of time-use categories. \*Significant at the 90% level. \*\*Significant at the 95% level. \*\*\*Significant at the 99% level.

**Table 2-B. Estimates of the effect of health status on various time use categories using MTUS data, females**

	(1) Sleep		(3) Personal Care		(5) Market work		(7) Non-Market work		(9) Leisure	
<b>Females</b>	<i>SAHS</i>	<i>GOOD HEALTH</i>	<i>SAHS</i>	<i>GOOD HEALTH</i>	<i>SAHS</i>	<i>GOOD HEALTH</i>	<i>SAHS</i>	<i>GOOD HEALTH</i>	<i>SAHS</i>	<i>GOOD HEALTH</i>
<i>France (N=3,362)</i>	-0.018*** (0.004)	-0.029*** (0.007)	-0.021*** (0.007)	-0.032** (0.014)	0.071*** (0.022)	0.113*** (0.041)	-0.015 (0.013)	-0.016 (0.024)	0.028** (0.013)	0.053** (0.024)
<i>Germany (N=8,701)</i>	-0.010*** (0.003)	-0.013*** (0.004)	-0.016*** (0.005)	-0.028*** (0.008)	0.051*** (0.013)	0.050** (0.022)	-0.021** (0.008)	-0.026* (0.013)	0.008 (0.007)	0.022* (0.012)
<i>Italy (N=8,110)</i>	-0.009*** (0.003)	-0.007* (0.004)	0.015*** (0.005)	0.020*** (0.007)	0.009 (0.015)	0.029 (0.021)	-0.031*** (0.009)	-0.050*** (0.014)	0.028*** (0.009)	0.033*** (0.013)
<i>The Netherlands (N=6,737)</i>	-0.027*** (0.004)	-0.059*** (0.007)	-0.020*** (0.007)	-0.038*** (0.013)	0.106*** (0.019)	0.238*** (0.036)	-0.054*** (0.012)	-0.109*** (0.023)	0.005 (0.010)	0.026 (0.019)
<i>Spain (N=7,927)</i>	-0.010*** (0.003)	-0.016** (0.006)	0.005 (0.004)	-0.004 (0.008)	0.062*** (0.014)	0.126*** (0.026)	-0.037*** (0.009)	-0.060*** (0.017)	0.005 (0.009)	0.001 (0.017)
<i>The United Kingdom (N=5,326)</i>	-0.013*** (0.003)	-0.022*** (0.007)	0.001 (0.006)	0.002 (0.012)	0.085*** (0.016)	0.168*** (0.035)	-0.016 (0.010)	-0.039* (0.022)	-0.013 (0.009)	-0.032* (0.019)

*Notes:* Robust standard errors in parenthesis. The sample is restricted to part-/full-time male workers between the ages of 21 and 65 (inclusive) included in the Multinational Time Use Study (MTUS) from France, Germany, Italy, the Netherlands, Spain and the United Kingdom. Regressions include age and its square, secondary and university education, the number of children under 18 in the household, household size, whether the youngest child is under 5, whether the youngest child is 5-12, whether the youngest child is 13-17, civil status (ref.: not in couple), day-of-week dummies (ref.: Saturday) and month dummies (ref.: December). *Time use activities* are measured in hours per day, see Table A2 for definitions of time-use categories. \*Significant at the 90% level. \*\*Significant at the 95% level. \*\*\*Significant at the 99% level.

**Table 3. Work-Life Balance measures in analyzed countries, 2003**

	<b>I have come home from work too tired to do household jobs</b>	<b>It has been difficult to fulfil family responsib. because of time spent on job</b>	<b>I have found it difficult to concentrate at work because of family responsib.</b>
Panel A: Men			
France	15.6	7.5	1.1
Germany	23.3	5.9	0.7
Italy	20	9.2	1.2
Netherlands	11.3	4.3	3.4
Spain	34.5	14.7	1.3
The UK	22.5	12.1	7.8
Panel B: Women			
France	21.1	7.9	2.5
Germany	8.7	4	0.1
Italy	25.1	11.6	3.3
Netherlands	13.1	5.2	2.7
Spain	45.9	22.9	8.2
The UK	37.1	7.8	5.2

*Notes:* Authors' calculations from questions included in the European Quality of Life Survey 2003, developed by EUROFOUND. Figures represent the percentage of individuals answering "Several times a week" to the questions shown in heading of Table 3.

## APPENDIX

**Table A1. Description of time use surveys**

<b>Country</b>	<b>Year</b>	<b>Survey coverage</b>	<b>Original sample size</b>	<b>Analysis sample size</b>
<b>France</b>	1998	16 February 1998 - 14 February 1999	15,441 diaries	7,284 diaries
<b>Germany</b>	2001	April 2001 - March 2002	35,813 diaries	17,621 diaries
<b>Italy</b>	2002	April 2002 - March 2003	51,206 diaries	20,210 diaries
<b>The Netherlands</b>	2000	Oct-00	15,428 diaries	5,723 diaries
	2005	Oct-05	12,691 diaries	7,319 diaries
<b>Spain</b>	2002	October 2002- October 2003	46,774 diaries	19,394 diaries
<b>The United Kingdom</b>	2000	June 2000 - August 2001	19,400 diaries	8,891 diaries
	2005		4,941 diaries	1,768 diaries

*Source:* Multinational Time Use Study (MTUS, [www.timeuse.org](http://www.timeuse.org)) version 553 and harmonized surveys by authors. “Analysis sample size” refers to the number of observations from each survey that we use in our main empirical analysis. We restrict the sample to include only those individuals who had time diaries that summed to a complete day (i.e., 1440 minutes). All surveys include sample weights, and weights are adjusted to ensure each day of the week and each survey are uniformly represented.

**Table A2. Classification of time use activities**

Time use categories	Time use activity codes
<i>Sleep</i>	"Sleep"
<i>Personal Care</i>	"Dress/personal care", "Consume personal services", "Meals and snacks"
<i>Market work</i>	"Paid work", "Paid work at home", "Paid work, second job", "Travel to/from work", "School, classes", "Study, homework"
<i>Non-Market work</i>	"Cook, wash up", "Housework", "Odd jobs", "Gardening", "Shopping", "Childcare", "Domestic travel"
<i>Leisure</i>	"Free time travel", "Excursions", "Active sports participation", "Passive sports participation", "Walking", "Cinema or theatre", "Dances or parties", "Social clubs", "Pubs", "Restaurants", "Visit friends at their homes", "Listen to radio", "Watch television or video", "Listen to records, tapes, cds", "Read books", "Read papers, magazines", "Relax", "Conversation", "Entertain friends at home", "Knit, sew", "Other leisure", "Religious activities", "Civic activities"

Source: Multinational Time Use Study (MTUS).