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The Effect of Working Hours on Self-Perceived Health and Job Satisfaction

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Abstract

As working time limiting policies have been developped globally over the last decades, the question remains whether working fewer hours actually impacts worker's self-perceived health and their levels of job satisfaction. This paper adds to the current literature by jointly studying the effect of working hours on these two outcomes using a cross-sectional sample of around 25 countries with OECD survey-data. Through linear and ordered logit regression models, it examines the role of working hours and other job and background characteristics in shaping health and job satisfaction. The results suggest that working more hours could be harmful for worker's health and job satisfaction, although these effects are relatively small and gender differences in these effects ar absent.

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1 Introduction

The well-known economist John Maynard Keynes once predicted that the somewhat utopian three-hour workday would prevail for his grandchildren's generation. Although it is strongly debatable whether this prediction is true in 2023, some legal progress limiting working hours has been made (Messenger et al., 2007). Working hours regulations have been widely included in national and international legislation. Not only do they exist in labour law, but working hours limits have also been identified as a human right in the Universal Declaration of Human Rights. Data from the European Working Conditions Survey uncover that roughly 30% of workers in the European Union believe their work poses a threat to their health. Likewise, the percentage of workers agreeing with this is increasing in their number of hours worked (Berniell, 2012). This gives a reason to believe that increased working hours might have harmful consequences for one's health.

The 40-hour workweek is the most prevalent standard nowadays. This has not always been the case, since a ten-hour daily limit preluded the legislative starting point in Europe by the start of World War I, whilst the United States and New Zealand had adopted a 48-hour workweek by the beginning of the 20th century (Messenger et al., 2007). An overview of the situation in the 21st century indicates that most European and North American countries mandate a 40-hour or shorter working week. In contrast, many South American and Asian countries still have a 48-hour one (ILO, 2013). In addition to facilitating sufficient non-work or 'leisure' time for workers, preserving the worker's health has been a main policy objective of working hours regulations (Messenger et al., 2007).

Relatively often in academia, unemployment has been linked to adverse effects on health (Wilson et al., 1993). This evokes the question of whether working conditions for employed people could also harm their health and other measures of subjective well-being and whether these relationships are impaired by gender. As different gender roles in both the work and the family sphere are likely to exist, men and women might be expected to respond differently in terms of their health to increasing responsibilities at work. A more accurate and complete answer to the question could offer employers the tools to monitor and support employees working long hours or those transitioning into jobs requiring them to work substantially more hours than in their previous job. It could also be thought-provoking for policymakers and national legislators who are in charge of setting working time limits. If certain employees working under the current regime systematically tend to suffer from health issues, contributable to working longer hours, it could warn them and provide them with a reason to modify these working time limits accordingly. If women appear to suffer more from these issues, policies could target occupations with large shares of female employees. From an economic cost perspective, preventing burn-out symptoms among employees could save a large amount of costs related to physician turnover and reduced clinical hours as Han et al. (2019) estimated that $4.6 billion of these costs can be attributed to burnout in the United States yearly.

So far, a relatively small body of literature has examined the effect of the number of working hours on workers' health status. Evidence has been found in Germany that a one-hour increase in weekly hours worked decreases self-assessed health by nearly 2% and increases the number of doctor visits by roughly 13% (Cygan-Rehm et al., 2018). A similar study done in France concluded that shorter workweeks from 39 to 35 hours decreased smoking by 6 percentage points and appeared to decrease body mass index among white-collar workers (Berniell et al., 2020). However, whether these or similar results also apply to a broader variety of OECD nations is still unclear. Additionally, Menéndez et al (2007) particularly stress that potential pathways through which precarious employment leads to ill health are lacking. This research will attempt to fill this gap in the academic literature by using a variety of controls and shed light on possible gender differences within the effect of working hours on health. All of this will be done in the context of an OECD individual-level cross-country data analysis.

Several studies have also examined the joint or separate effects of working conditions, including working time, on measurements of job satisfaction. Many of these studies draw their attention to very specific occupational groups, such as nurses, dentists or workers with disabilities and therefore provide results that are generalizable to very narrowly defined groups of individuals only. This paper allows bypassing this problem by examining a fairly broad and diverse sample. Lastly, this paper will jointly examine the effects on health and job satisfaction, which has not been done before in the academic literature.

This paper will therefore examine the following two research questions:

1. *What is the effect of the number of usual weekly working hours on one's self-perceived health status and to what extent are there gender differences regarding this effect?*
2. *What is the effect of the number of usual weekly working hours on one's job satisfaction and to what extent are there gender differences regarding this effect?*

The remaining part of this paper is structured as follows: Section 2 will give a short overview of working hours limits and actual hours worked across the world as well as an overview of the associations between working hours, health and job satisfaction in the literature. Next, Section 3 will describe the data used. Then, Section 4 reports the methodology used. Section 5 presents the results and finally, Section 6 concludes and discusses the shortcomings of this paper, its implications for theory and practice and possible suggestions for future research.

2 Institutional Background & Related Literature

As mentioned in the introduction of this paper, a relatively small but considerable body of academic literature has examined the effect of the number of hours worked on a worker's health status. However, before diving deeper into these empirical findings, it is important to sketch the legal and institutional structures underlying this effect, how these structures have developed historically and to what extent they still differ across regions and countries in the world.

2.1 An overview of working hours limits worldwide

The extent to which working time is limited by the law varies substantially across countries. Figure 1 depicts the distribution of normal weekly hours limits across the world, in which overtime work is excluded (ILO, 2013)[1]. Europe appears to be the region with the highest percentage of countries adopting the 'typical' 40-hour workweek, with almost tipping 70% of the countries. The Americas and the Caribbean and the Arabic States show the largest extent of deregulation, with between 75-85% of the corresponding countries having normal weekly working hours limits exceeding 40 hours. Looking at the regions altogether, the majority of countries still have limits exceeding 40 hours. However, it should be noted that Asian countries such as India, Pakistan and Sri Lanka formally do not have universal working hours limits, although daily and weekly hours limits are set at a national industry level. For certain African countries that formally do not possess a universal limit either, such as Nigeria and Zimbabwe, it is uncertain if other active laws exist that limit working time (ILO, 2013).

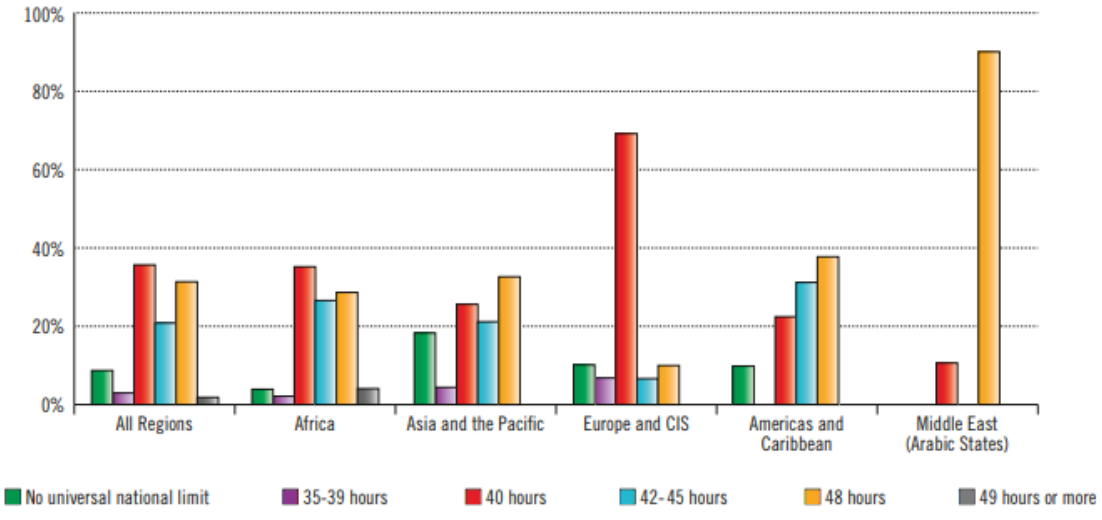

Figure 1. Normal weekly working hours limits by country and region, 2012

[1] The source of this figure is: ILO Working Conditions Laws Database. ILO, Geneva. Available at: http://www.ilo.org/dyn/travail.

2.2 Worldwide developments in actual working hours

The mere existence of standards regarding normal statutory weekly working hours does not necessarily imply that such standards will always materialize in practice. Fundamental gaps between what is written in law and what is happening in practice might exist. Therefore, working hours regulations need to be compared to actual working time patterns to consider the real effect of these regulations.

The 12-hour workday, adopted during the beginning of the Industrial Revolution in most Western European countries, got slowly opposed to the importance of guaranteeing leisure for workers, which was gradually being acknowledged (Messenger et al., 2007). During the 20th century, periods such as post-World War I and post-World War II can generally be defined by supporting further progressive reductions in working hours (Messenger et al., 2007). At the beginning of the 21st century, working weeks have largely converged towards 40 hours, especially in European countries. Only a significant minority of countries, such as Costa Rica, Hong Kong and Peru, saw an increase in their working time limits. A common assumption, which particularly seems to hold for the group of low-income countries, is that working time length is negatively correlated with national income level (Messenger et al., 2007).

In addition to cross-country differences, patterns and variations in individual working hours can be observed within countries as well. Statutory working hours limits generally provide a safeguard for unorganized workers. Collective agreements, on the other hand are observed to have a vital role in determining working hours as well as shaping within-country working hours distributions. As a consequence, working hours can fluctuate depending on collective agreements, causing multiple peaks in the working hours distribution (Artazcoz et al., 2016). This is typically the case for Germany and Austria for example. Countries, such as Belgium, in which part-time work is more common, typically have a different type of distribution, usually containing two peaks: one at the standard (+/- 40 hours) and one significantly below this standard. In developing countries, an entirely different regime is commonly expected, such as one with a group of overworked workers along with a group of workers working only very short hours. This leads to a peak above the standard and one far below (Messenger et al., 2007). Graphical illustrations showing examples of the three types of regimes as described above are depicted in Figure 2 below[2].

Besides, Artazcoz et al. (2016) argue that gender differences in working hours in the family sphere might well depend on the type of welfare state a household is residing. Nordic countries, for example, have moderately regulated labour markets, including social policies to promote maximum employment levels for women and they are typically characterized by dual-earner models. On the other side of the spectrum, Continental and Southern European countries have labour markets that are under strict control of the

[2] The source of this figure is: ILO Working Conditions Laws Database. ILO, Geneva. Available at: http://www.ilo.org/dyn/travail.

central government. They also typically have male breadwinner family models which are little supportive of women entering the labour market.

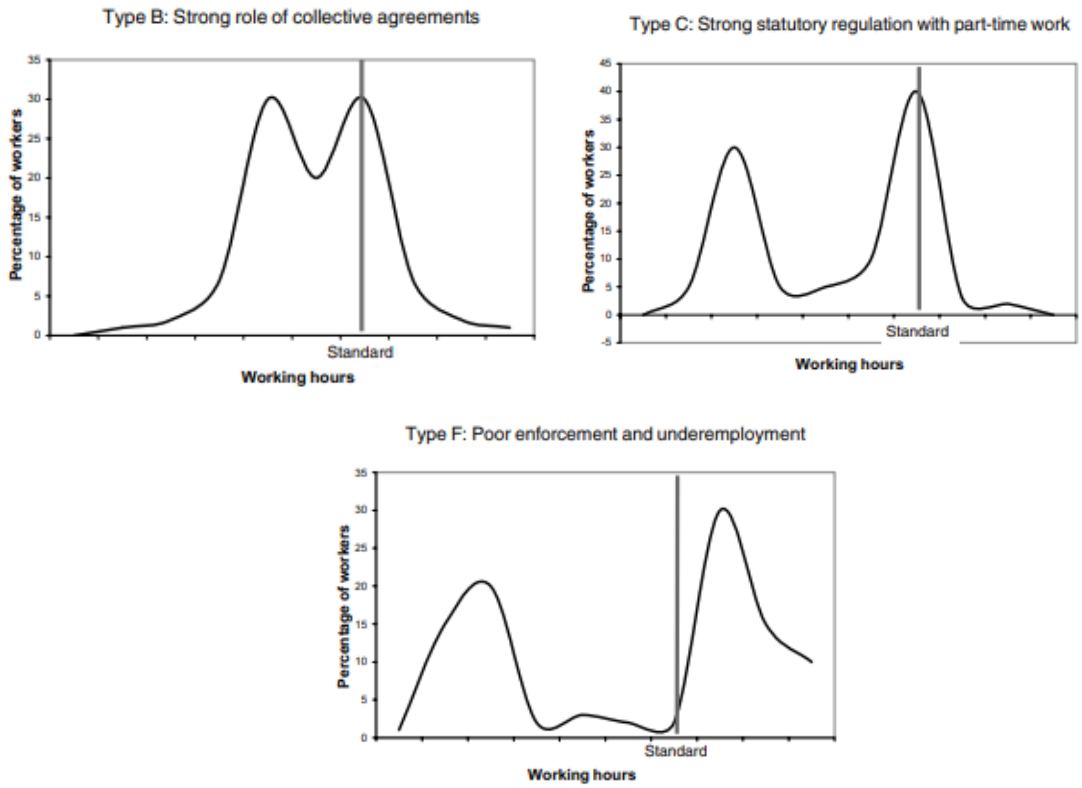

Figure 2. Illustrative examples of different types of working-hour distributions: Germany and Austria are examples of type B-regimes, Belgium of a type C-regime and certain developing countries of a type F-regime

2.3 The association between working hours and health

Links between working hours and an individual's health status have steadily been made in the academic literature. Although not all studies look at the same aspects of health in terms of outcome variables, negative associations between working hours and health status have been observed fairly often. The literature distinguishes various mechanisms through which working hours can influence one's health. In the upcoming two subsections, the effects of working time on various health outcomes will be discussed as well as the possible mechanisms that could be at the heart of these relationships.

2.3.1 The effect of working hours on short-run health behaviors

Berniell (2012) exploited a change in legal maximum workweek hours in France by utilizing a difference-in-difference design. The estimated effects were all found to be consistent with the idea that fewer working hours are positively related to one's health. The study found that after the workweek reduction, which was 3.5 hours on average, the probability of smoking decreased by 4.3%. The

workweek reduction was also associated with a reduction in BMI, although this effect was only significantly below zero for the group of individuals with a BMI below the median value of 24. Moreover, each additional hour worked was found to increase the probability of drinking alcohol by 8% and reduce the probability of doing sports by 2.2%. However, direct effects on health status measurements were not found, most likely because this research was mainly capturing short-run effects. However, the short-run changes in health behaviors found are considered indicative of the existence of a long-run health effect (Berniell et al., 2012). Since, similar to many other studies, it only looks at France, this study fails to examine whether variations across countries in health status and health behaviors can be contributed to variations in their workweek's length.

Similar to the empirical strategy of Berniell et al. (2012), Ahn (2016) used exogenous variation in adopting a reduced workweek in South Korea as an instrument for work hours in a fixed effects regression model. The work hours reduction was associated with a decrease in the likelihood of smoking, particularly among heavy smokers. It also led to higher frequencies of regular exercise, except for women and older groups. Meanwhile, it did not significantly influence the likelihood of frequent or daily drinking (Ahn, 2016).

Åkerstedt et al. (2001) studied the effects of a 6-hour working day on health and well-being during one year for a sample of Swedish childcare workers. Even though effects on exercise, weight and BMI were not found, a large positive effect of the reduction of working hours (which was on average 8.7 hours for the treatment group) on time for social activity and family and friends was estimated, increasing from 'too little' to between 'almost sufficient' and 'completely sufficient' in the survey. Moreover, subjective sleep quality, mental fatigue and heart symptoms were observed to improve significantly more in the treatment group, compared to the control group. Yet, especially since the study deals with a small sample consisting of less than 100 individuals, it cannot be concluded what aspect of reduced hours exactly contributed to the health improvements observed.

On top of this, Virtanen et al. (2018) studied the link between long working hours and the start of depressive symptoms through a cross-country analysis. The associations found were stronger for Asian countries, such as Japan, South Korea and Thailand compared to countries from Europe, North America and Australia, possibly capturing health policy differences across cultures and occupations between Asia and the Western regions (Virtanen et al., 2018). This striking difference could also be explained by the Asian working culture. A common characteristic of this working culture is the notion that showing signs of 'weakness', such as depression, means being disloyal to one's co-workers. This might prevent workers from seeking help in the early phase of the disease, which could worsen the depressive symptoms even further (Virtanen et al., 2018). It could be verified in this paper whether the results follow a similar pattern among the different countries as the results concerning these depression symptoms.

2.3.2 The effect on overall (self-perceived) health status and gender differences

Bell et al. (2012) analyzed the effect of working time on health within the framework of mismatches between desired and actual working time for individuals in Germany and the United Kingdom. They found that working more hours than desired negatively affects different measures of the self-perceived health of these individuals. Similar to this study, the vast majority of papers regarding the effect of working hours on one's health point into the direction of a negative effect of working hours on health. This leads to the first hypothesis:

Hypothesis 1a: Working a greater number of hours per week leads to a lower self-perceived health status among employees.

However, the patterns observed by Bell et al (2012) did not develop similarly for all individuals in the sample. Among women, adverse health effects of working longer hours were observed across all ranges of actual hours worked, whilst, among men, these effects were only observed, once actual hours worked exceeded 35 hours per week (Bell et al., 2012). The authors suggest this striking difference could be contributed to the fact that females are more likely to have other family care-related time constraints. On the other side of the spectrum, the authors found that most underemployed men (working fewer hours than desired) reveal a lower health state in comparison with the reference category, whilst for women, this is only true if they are working less than 20 hours a week. The authors attempt to relate this finding to male preferences for full-time employment, which are possibly induced by gender identity and traditional gender roles (Akerlof et al., 2000).

In their study on the link between long working hours and health in Europe, Artazcoz et al. (2016) focussed on the health and psychological well-being effects for individuals working between 40 and 60 hours a week. Quite notably, among women from Continental, Anglo-Saxon and Southern European countries, being the main contributor to the household was linked to working long hours. This fairly contradicts the findings of Akerlof et al. (2000), which stress the existence of male preferences for working full-time and the possibly resulting gender difference observed in the relationship between working fewer hours than desired and one's health status (Bell et al., 2012).

For men, working long hours was associated with poorer psychological well-being, except for men from Continental countries. Associations with poor psychological well-being were found for all men as well, except for those from Southern European countries. Among women from Continental countries, no associations were established for three poor work-related health outcomes. Remarkably, in Southern European countries, the negative association was more consistent among women than among men. This supports the finding of Bell et al. (2012) that contrary to women, adverse health effects of working long hours for men were only observed beyond a certain threshold in Germany and the United Kingdom. Long working hours were linked with poor health outcomes in Anglo-Saxon countries as well. In Eastern European countries, no associations between long working hours and poor self-perceived health status

were made, which could be explained by the reasoning that moderately long working hours might reflect a preferred option since it is compenated by higher earnings (Artazcoz et al., 2016).

This type of reasoning could also explain the absence of associations with poor health outcomes in Nordic countries in this study, since in these countries, working 40-51 hours a week was linked with poor psychological well-being for women only. Previous research has suggested that in Nordic countries, workers might be able to afford and therefore be willing to accept lower earnings to have a lighter workload (Artazcoz et al., 2016). The forced nature of long working hours implied by this reasoning might clarify why strong relationships between long working hours and poor health outcomes in Nordic countries are lacking in this study.

In addition, Fein et al. (2015) mention that the strength of the relationship between working hours and health increases substantially with very long hours (51+). In their study on the effect of work hours on health in Australia, the authors attempt to clarify this relationship through the role of *work-life conflict*, a theory that emphasizes the stress that occurs when individuals cannot meet the demand of their social roles (Goode, 1960). Since women are more likely to experience strain concerning time, energy and opportunity to fulfill certain unpaid work obligations, such as family care, working longer hours might have a stronger impact on women's work-life conflict and well-being. The greater amount of time and effort spent in unpaid care and domestic work creates more stress for women when they face a situation in which they have to combine paid work and unpaid care (Fein et al., 2015). This study, however, uses a relatively broad measure of parenting responsibilities by only including the potential presence of at least one child aged 17 years or under. In that sense, this paper could therefore contribute to the literature by using more sensitive measures, such as the number of children and the ages of the oldest and youngest child.

The results of the study supported a negative relationship between work hours and health outcomes. When considering the influence of gender and parenting status on this effect, an expected stronger association for women was found, consistent with Bell et al. (2012) and Azcarzoz et al. (2016). Similar to these studies, a considerable majority of the studies examining gender differences within this effect find statistical support for a stronger negative effect for women. Therefore, the following hypothesis can be formulated:

Hypothesis 1b: The reduction in self-perceived health status due to working a greater number of hours per week is stronger for female than male employees.

2.4 The association between working hours and job satisfaction and gender differences

Job satisfaction is an abstract concept that still provokes fundamental disagreement in terms of its definition. As general agreement on what exactly can be brought under the definition of a job has not been reached, defining job satisfaction constitutes an even harder task. Aziri (2011) mentions that job satisfaction refers to a mix of positive and negative feelings that workers cherish towards their work. On top of this, job satisfaction can be viewed as a worker's sense of accomplishment and success at the workplace. Statt (2004) particularly adds the importance of the extent to which a worker is satisfied with the rewards that she or he gets out of the job for defining job satisfaction, especially the ones related to intrinsic motivation.

Studies on the association between working hours and job satisfaction are less widespread in the literature compared to papers examining the relationship between working hours and health outcomes. The existing studies largely tend to focus on specific occupational groups, such as nurses, dentists or bank employees. However, a small number of studies exist that examine this effect for a more general population. Zheng et al. (2023) studied the impact of working hours on job satisfaction in 30 provinces in China. The authors found that on average, working an additional hour a day led to a decrease in job satisfaction by 0.067 points on a 5-point scale.

Besides, the authors also considered the threshold effects of working hours and found job satisfaction to be unaffected by changes in the number of working hours for individuals working less than 9 hours a day (Zheng et al., 2023). Nevertheless, once an individual is working more than 9 hours a day, an incremental hour worked was associated with a 0.055 points drop in job satisfaction. Moreover, the reduction in job satisfaction due to more working hours appeared to be larger for females compared to males, which is a fairly similar pattern as the one observed in the effect on health outcomes (Bell et al., 2012; Fein et al., 2015; Artazcoz et al., 2016).

Another study done on the relationship between working hours and job satisfaction for Chinese workers found an inverted U-shaped association between the two measures, implying job satisfaction initially increases up to an optimal point beyond which it steadily decreases (Dong et al., 2021). Even so, among others, a moderating effect of work scheduling autonomy was found, implying it can improve overall job satisfaction, even if individuals are working long hours (Dong et al., 2021). Since this paper will also look at similar flexibility measures for the sample studied, it can check whether a similar moderating effect of these flexibility measures exists or not.

Within a similar framework as used by Bell et al. (2012), Cornelißen (2006) analyzed the effect of multiple job characteristics, such as work time, on job satisfaction through a factor analysis for West-German private sector employees. A deviation of desired from actual work time significantly reduced job satisfaction. Opposite to this result, together with job security, work time ranked last regarding its influence on job satisfaction (Cornelißen, 2006).

Altogether, the findings of the papers suggest that working more hours a week might negatively affect job satisfaction, at least once weekly working hours exceed a certain threshold. Besides, stronger associations between the two variables were found for women (Zheng et al., 2023). Moreover, the same mechanisms could be at play as those that potentially cause stronger negative health effects among women. Consequently, the following hypotheses can be formulated:

Hypothesis 2a: Working a greater number of hours per week leads to lower levels of job satisfaction reported by employees.

Hypothesis 2b: The reduction in job satisfaction due to working a greater number of hours per week is stronger for female than male employees..

3 Data

3.1 Description of the dataset

The data that will be used will be coming from databases retrieved from OECD as a main source. It concerns cross-sectional micro-level data which are all retrieved from a database called 'Program for the International Assessment of Adult Competencies' (PIAAC). PIAAC is a widely conducted survey, performed by the OECD, measuring key cognitive and workplace skills needed for individuals to properly participate in society and for national economies to flourish. The survey functions as a tool that allows policymakers to monitor the growth of key components of human capital in their nations (OECD, 2013). The survey has been conducted in over 40 countries, with around 5.000 individuals aged 16 to 65 in every participating country being interviewed in their homes, by answering survey questions either via computer or via pencil-and-paper.

The survey is administrated every ten years and has had two cycles so far: the first one from 2011-2017 and the second one in 2022-2023. The results of the latter are expected to be released in 2024 (OECD, 2013). This paper will therefore only be able to use data from the 1st Cycle. In the first round of the 1st Cycle (2011-2012), the following countries participated: Australia, Austria, Belgium (Flanders), Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Japan, Korea, Netherlands, Norway, Poland, Russian Federation, Slovak Republic, Spain, Sweden, United Kingdom (England and Northern Ireland) and the United States. The following countries participated in the second round (2014-2015): Chile, Greece, Indonesia, Israel, Lithuania, New Zealand, Singapore, Slovenia and Turkey. Lastly, the countries participating in the third round (2017) were: Ecuador, Hungary, Kazakhstan, Mexico, Peru and the United States (OECD, 2013).

Several sections of the survey contain general questions regarding the respondents' background, capturing variables such as gender, age, and educational attainment as well as household-related variables, such as whether they are living together with a spouse or partner and their number of children. Other sections contain questions regarding the respondents' current and previous jobs, such as their employment status, the usual number of hours worked and level of job satisfaction. Another section consists of questions concerning how the respondents see themselves, capturing their self-perceived health status for example. The remaining sections ask the respondents certain skills-related questions.

Only the data for Australia could not be included in the dataset since the Australian Public Use File was not directly available from the OECD website[3]. The categorical variable 'Self-perceived health', originally measured on a 1-5 scale (5 = 'Poor', 1 = 'Excellent'), was recoded to reverse its order, such that a higher value also implies a better health status. The same procedure was followed for the

[3] Access to the Australian Public Use File required a separate mailing procedure with the Australian data authority that could not be realized within a short time span.

categorical variable 'Job satisfaction', also measured on a 5-point scale (1 = 'Extremely satisfied', 5 = Extremely dissatisfied'). All observations corresponding to an answer other than 'Employed or self-employed' on the question asking respondents about their current employment status were deleted from the dataset in order to include employed individuals in the analysis only.

3.2 Variable measures

3.2.1 Key variables

Weekly hours worked

Since this paper attempts to examine the effect of the number of weekly hours worked on both self-perceived health status and job satisfaction, weekly hours worked are simply measured as a numerical response to the survey question: 'How many hours do you usually work per week in this job? Include any usual paid or unpaid overtime but exclude lunch breaks or other breaks' (OECD, 2013).This question does not allow respondents to report the details for multiple jobs, in case they are working in more than one. It implicitly requests them to report the details of their main or most important job only. In the dataset, it is both included as a continuous and a categorical variable.

Self-perceived health

Being the most important outcome variable in this paper, the respondents rated their self-perceived health by answering the question: 'In general, would you say your health is excellent, very good, good, fair, or poor? Health can both include physical and mental health.' Self-perceived health is measured on a 5-point scale, in which 1 denotes 'Poor' and 5 denotes 'Excellent' (OECD, 2013). In the dataset, this variable has been recoded so that up from 1 to 5, a higher level implies a better health status.

Job satisfaction

As a second outcome variable, job satisfaction measures the respondent's self-reported job satisfaction, capturing the respondent's answers to the following question: 'All things considered, how satisfied are you with your current job?' This variable is also measured on a 5-point scale, in which 1 denotes 'Extremely dissatisfied' and 5 denotes 'Extremely satisfied' (OECD, 2013).

3.2.2 Control variables

In order to account for important background characteristics that are potentially correlated with working time and the two outcomes, some control variables will be included in the analysis. These control variables will likely reduce omitted variable bias in the models and their relevance will therefore be clarified[4]. The first control variable is gender, which will either denote male or female. Gender differences in health and health risks have generally been acknowledged in the literature, although it is

[4] Ideally, hourly or weekly earnings would have been included as a control variable too, but due to data privacy laws, these data were unavailable for most individuals in the sample, which would have resulted in too few observations.

argued that they might well vary over different risk types and different phases of the life cycle (Macintyre et al., 1996). On the other hand, gender differences in the number of hours worked have also been found in the literature. In a study on working hours for both men and women in the United States and Australia, men turned out to be working slightly more, in terms of paid work, than women in both countries. However, these gender gaps in working hours varied substantially by family type (Sayer et al., 2009). Furthermore, Clark (1997) found that levels of job satisfaction reported by women were significantly higher than those reported by men, even after controlling for a large number of individual and job characteristics.

The second control variable is age. Although age patterns in working hours have changed over time, both male and female total hours in the US, UK and France show a peak between the ages of 40 and 50, after which they increasingly decline towards the age of 70 (Blundell et al., 2013). Therefore, age is expected to be correlated with working hours. It can also be expected that, as individual ages, more health-related problems might arise, potentially lowering their self-perceived health status. Furthermore, Clark et al. (1996) obtained statistical evidence for a significant U-shaped relationship between age and overall job satisfaction, in which job satisfaction starts at a high point at the beginning of one's career, reaches its minimum somewhere in one's mid-thirties and gradually increases to reach a maximum in one's sixties.

The third control and fourth control variable are whether the respondent is living together with a spouse or partner and whether the respondent has children in the household respectively. Both control variables are likely related to working hours. Living together with a spouse or partner could decrease working hours, since decreasing working hours, and therefore probably decreasing income and consumption, could be offset by the working hours and the income generated by the spouse. In addition, if a household consists of children, more income and therefore more working hours might be needed to provide for them on the one hand. On the other hand, having more children, depending on the age of these children, could induce more family care-related responsibilities which might decrease working hours. For this reason, the age of the youngest child in the household will also be included as a control variable. By using a simple family labour supply model, Blau et al. (1988) show that the cost of market childcare will influence household decisions on working hours and child care.

Although the literature is relatively mixed, numerous studies have indicated that married individuals enjoy better health than those who were never married (Mata et al., 2015). In contrast, Berge et al. (2011) found that weight-related health is slightly worse for parents of young children compared to non-parents, especially for women. Whether these patterns extend as the number of children in a household grows, is quite unclear in the literature. Gazioglu et al. (2006) obtained statistical evidence indicating that those living together with a spouse or partner are less satisfied with their job than single individuals. Hodson (1989) found that women report greater job dissatisfaction due to having children under six.

The next control variable will be the respondent's highest level of education obtained according to the International Standard Classification of Education (ISCED). Stier et al. (2003) found that the preferences for hours of work decreased with the level of education obtained for individuals in 22 countries, implying a negative relationship between education level and working hours. Even though consensus regarding the explanations has not been fully formed yet, a positive association between education and health is well established in the literature (Ross et al., 1995). Although somewhat surprising, relationships between higher levels of education and lower job satisfaction are well-established in the literature (Clark et al., 1996; Gazioglu et al., 2006).

Lastly, flexibility is introduced as a control variable. It concerns the respondents' self-reported amount of flexibility regarding their working hours. The respondents rated their flexibility on a 5-point scale by answering the following question: 'To what extent can you choose or change your working hours?'. A value of 1 means 'Not at all' and a value of 5 means 'To a very high extent' (OECD, 2013). Individuals with higher flexibility might be able to work fewer hours compared to individuals with little flexibility, who might be more stuck to a typical 40-hour workweek. Furthermore, Butler et al. (2009) found that greater workplace flexibility, including flexibility in deciding one's working hours, is positively related to self-reported health. Besides, Origo et al. (2008) found that flexible working time decreases job satisfaction, compared to extrinsic job facets.

3.3 Descriptive Statistics

3.3.1 Full sample characteristics

The descriptive statistics of the PIAAC dataset depicted in Table 1 below provide a clear insight into the sample studied. Self-perceived health has a mean of 3.423, which indicates a health status slightly above 'Good', corresponding to a value of 3. However, its standard deviation is rather large. Job satisfaction has a mean of almost 4, which is just below 'Satisfied'. Its standard deviation is also slightly lower. Weekly working hours have a mean of 40.540, just above the common number of 40. Males constitute slightly more than 52% of the sample, whilst females constitute the remaining 47%. Furthermore, 73.1% of the respondents indicate living with a spouse or partner and the average number of children in the household reported is 1.355. For those having children, the age of the youngest child is 14.754 on average, which is the age at which living with the parents is most likely for the child. Finally, the average amount of flexibility reported in deciding their working hours is 2.539 which falls in between 'Very little' and 'To some extent'.

Table 1. Descriptive statistics for a selection of variables

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Self-perceived health	120,565	3.423	1.012	1	5
Job satisfaction	120,443	3.966	0.832	1	5
Weekly working hours	103,159	40.540	13.331	1	97
Male	117,230	0.522	0.499	0	1
Partner	107.778	0.731	0.443	0	1
Number of children	98,810	1.355	1.412	0	25
Age of the youngest child	49,247	14.754	10.033	0	49
Flexibility	120,427	2.539	1.392	1	5

Notes: Self-perceived health and job satisfaction are measured on a 1-5 scale. Male takes on value 1 if the respondent is a male and 0 for female. Partner takes on value 1 if the respondent reports living with a partner and 0 otherwise. The same goes for Children. Flexibility denotes the respondent's self-reported flexibility in deciding their work hours, for which 1 represents 'Not at all' and 5 'To a very high extent'. A more extended overview of the descriptive statistics belonging to this dataset is depicted in Section A, Table A1 in the Appendix.

A more comprehensive overview of the sample characteristics is presented in Section A, Table A1 in the Appendix. It indicates that overall, men show slightly higher levels of self-perceived health, whilst women indicate enjoying slightly higher levels of job satisfaction. Individuals aged 35-44 constitute the largest age group in the sample, with percentages of 25.65 and 26.57 for men and women respectively. Next, women also have higher education than men, with 51.50% of women having an 'above high school' degree, whilst this percentage is only 40.97 among men. Furthermore, women are also more likely to have children with 71.53% of women reporting having children, whilst this is 66.25 percent for men. Logically, conditional on having children, patterns in the number of children are very similar, with 2 children as the most frequent category, occurring for around 44% of parents. Lastly, men report higher levels of working time flexibility than women. Among women, 36.66% report having no flexibility at all and only 10.41% report having flexibility to a very high extent, whilst for men, this is 30.96% and 13.79% respectively.

3.3.2 Sample characteristics by geographical area

Figure 2, depicted below, shows the working hours distributions among four main regions which will be used in the remaining part of the cross-country analysis too. The figure shows that Latin America and the Caribbean on the one hand and East Asia and the Pacific on the other have very similar distributions. Around 50 percent of workers work 61-80 hours a week and between 30 and 35 percent work 21-40 hours per week. The patterns of countries in Central and Eastern Europe and North America and Western Europe show similarities. The percentage of workers working 21-40 hours per week is slightly above 60 in the Western countries whilst this is slightly below for countries in Central and Eastern Europe. For the percentage of workers working 41-60 hours, which is roughly 30%, this pattern is reversed. However, previous research found evidence that workers tend to greatly overestimate how long they

work, especially those who report working many hours (Robinson et al., 2011). The following numbers could therefore be slightly higher than they are in reality and should therefore be regarded with caution.

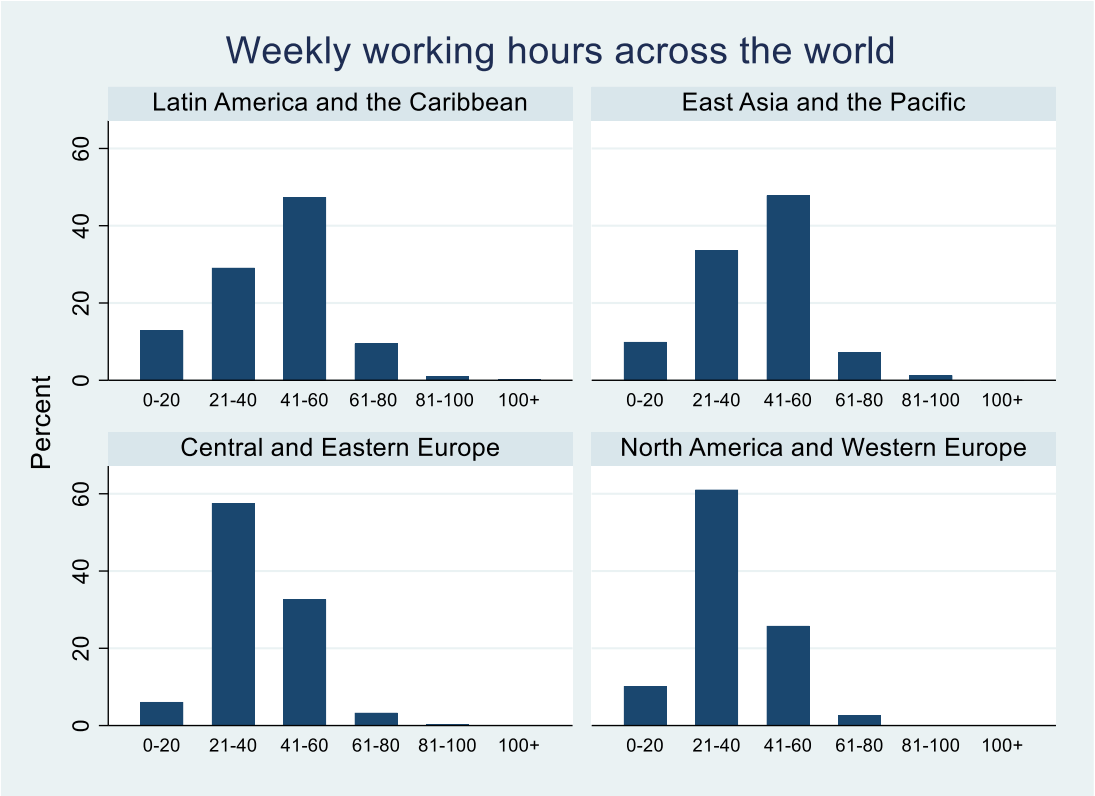

Figure 3. Distribution of weekly working hours across four regions, with the categories for weekly working hours depicted on the x-axis and the percentages depicted on the y-axis

Figure 4, depicted below, shows the distributions of self-perceived health scores across the four main regions. Except for the North American and Western European countries, people reporting a 'good' health status constitute the largest group. Quite notably, the share of respondents in Western countries reporting 'excellent' health is fairly high compared to the other regions Overall, the Latin American and Caribbean countries and the East Asian and Pacific countries show similar patterns. The Central and Eastern European countries have the most symmetric distribution and the Western countries have a left-skewed distribution, implying relatively high health scores.

Section A, Figure A1 in the Appendix shows the distribution of job satisfaction in the four regions. The patterns of all regions are very similar, although again, the Western countries are slightly better off, as these countries clearly have the highest percentages of workers reporting being 'very satisfied' with their current job. Workers who report being 'satisfied' with their job are by far the largest group, ranging from roughly 50 to 60% of workers across all regions. Moreover, a very small percentage of workers report being 'dissatisfied' or 'very dissatisfied' with their job. This goes for all regions.

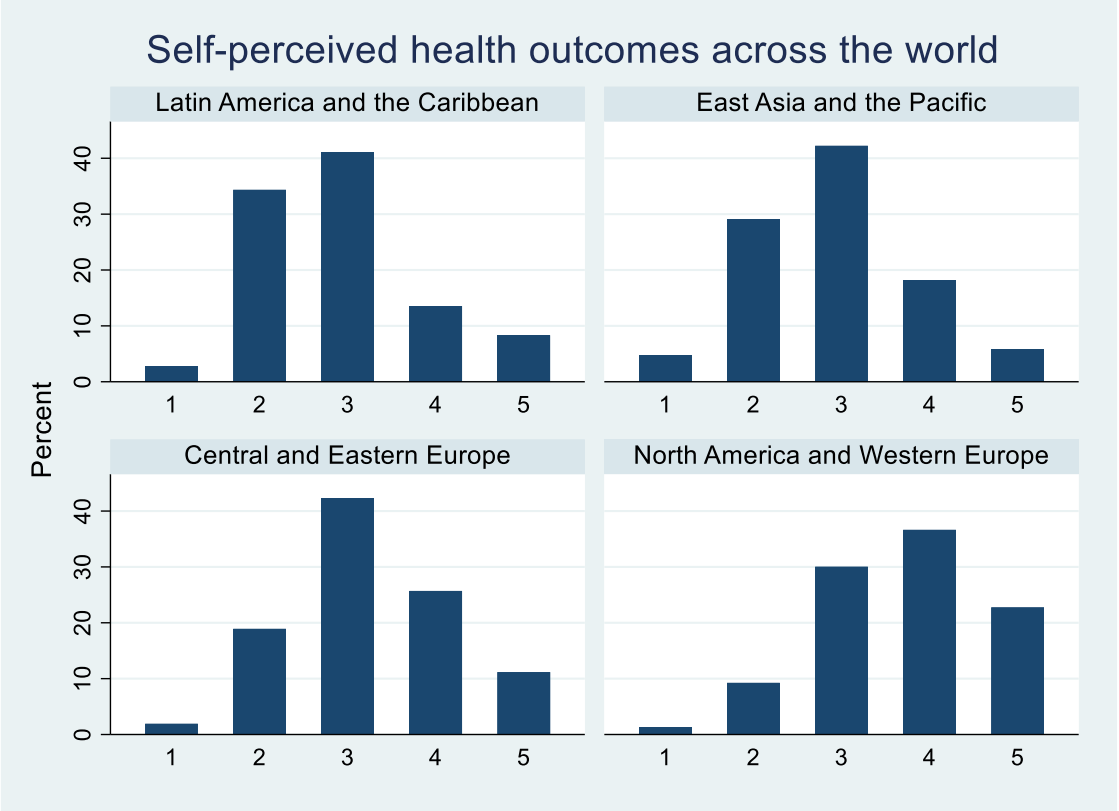

Figure 4. Distribution of self-perceived health scores across four regions, with the health categories depicted on the x-axis and the percentages depicted on the y-axis. Self-perceived health is measured on a 1-5 scale, in which 1 = 'Poor' and 5 = 'Excellent'.

4 Methodology

4.1 Regression equations

The main method of research will be an ordered logit multiple regression analysis. In this ordered logit approach, the self-perceived health of the surveyed individuals will be regressed against their number of hours usually worked per week. Additionally, some control variables will be added to the regression that are correlated with the number of hours worked and self-perceived health. These will be shown in the exact regression equation. Since self-perceived health outcomes in this survey were measured on a categorical five-point scale ranging from 'Poor' (1) to 'Excellent' (5), an ordered logit regression seems the best fit compared to other regression forms, such as a usual probit or logit regression. Models 1 and Model 2 depicted below will both be run in the form of a linear and ordered logit regression analysis:

$$Self-Perceived\ Health_i = \alpha_0 + \beta_1 * Weekly\ Hours\ Worked_i + \beta_2 * Male_i + \beta_3 * Male_i * Weekly\ Hours\ Worked_i + \beta_4 * Age_i + \beta_5 * Partner_i + \beta_6 * Children_i + \beta_7 * Age\ Youngest\ Child_i + \beta_8 * Education_i + \beta_9 * Flexibiliy_i + \beta_{10} * Male_i * Flexibiliy_i + \vartheta_j + \varepsilon_{ij} \quad (1)$$

$$Job\ Satisfaction_i = \alpha_0 + \beta_1 * Weekly\ Hours\ Worked_i + \beta_2 * Male_i + \beta_3 * Male_i * Weekly\ Hours\ Worked_i + \beta_4 * Age_i + \beta_5 * Partner_i + \beta_6 * Children_i + \beta_7 * Age\ Youngest\ Child_i + \beta_8 * Education_i + \beta_9 * Flexibiliy_i + \beta_{10} * Male_i * Flexibiliy_i + \vartheta_j + \varepsilon_{ij} \quad (2)$$

In this regression equation: the main dependent variable $Self-Perceived\ Health_i$ measures the self-perceived physical and mental health of the surveyed individual i on a scale from 1-5, in which a score of 5 denotes 'Excellent' and 1 denotes 'Poor'. $Weekly\ Hours\ Worked_i$ denotes the usual number of hours worked per week by the individual. $Male_i$ denotes the inividual's gender, in which the variable takes in value 1 if the inidvidual identifies as male and 0 for female. The interaction term $Male_i * Weekly\ Hours\ Worked_i$ will capture gender diindividual'sfferences in the treatment effect. Age_i is a categorical variable capturing the individual's age. It contains the categories 25-34, 35-44, 45-54 and 55 and older, refering to the reference category 25 and younger. $Partner_i$ is a binary variable indicating whether this individual is living with a spouse or partner (1) or not (0). $Children_i$ denotes the number of children this individual has, whilst $Age\ Youngest\ Child_i$ denotes the age of the youngest child in years. $Education_i$ is a categorical variable capturing the highest level of education obtained, denoting either 'High School' or 'Above high school', referring to 'Below high school' as the reference category. $Flexibility_i$ then denotes the extent to which the individual can choose or change its working hours, varying from 'Not at all' (1) to 'To a very high extent' (5). $Male * Flexibiliy_i$ captures gender differences regarding the effect of working time flexibility on the two outcome variables. In addition, ϑ_j measures country-fixed effects for the individual. Lastly, ε_{ij} denotes the error term concerning individual i from country j.

4.2 Assumptions multiple linear regression

The first assumption that will be checked for the linear regression models described above is the linearity assumption. This assumption emphasises that there needs to be a linear relationship between the independent variables and the dependent variable. In order to test this assumption, self-perceived health and job satisfaction have been plotted against weekly working hours, including a fitted regression line. These figures can be found in section B, Figures B1 and B2 of the Appendix. Although, due to the high number of observations, patterns are hard to define, the nature of the relationship between working hours

and the two outcome variables seems to be non-linear, a possibility that was already discussed in Section 2.

The second assumption that has to hold in the linear regression models is homoskedasticity of residuals, implying that the residuals have equal variance for every value of the fitted values and of the predictors. In order to test this assumption, a Breusch-Pagan Test has been performed. The results of this test are presented in section B, Table B1 and B2 in the Appendix. For both multiple linear regression models, the null hypothesis, stating that there is constant variance among the residuals, was rejected. It can therefore be concluded that heteroskedasticity is present in the data, which would violate this second assumption. In order to deal with this violation, robust standard errors will be used in the multiple linear regression models.

The third assumption that needs to be met is the normality assumption. This means that the residuals should approximately follow a normal distribution. This assumption was tested using a Kernel Density test. The results of this test, depicted in section B, Figure B3 and B4 in the Appendix indicate that the residuals have a slightly deviating trend from the normal distribution, especially the residuals corresponding to the relationship between job satisfaction and weekly working hours.

The last assumption is the assumption of no perfect multicollinearity, which implies that there are no independent variables present in the regression that are perfect linear functions of other independent variables. A correlation matrix was created in order to test this assumption. It indicates that there are no correlations which have an absolute value close to 1, except the correlation between $Male$ and $Male * Working\ hours$. However, this will most likely not harm the validity of the results. The correlation matrix can be found in section B, Table B3 in the Appendix. Although the normality assumption is fairly questionable, the assumptions largely tend to hold, especially for Model 1.

4.3 Assumptions ordered logit regression

In order for the results of the ordered logit model to be most reliable, one additional assumption has to hold, which is the proportional odds assumption. This assumption stipulates that the effects of any explanatory variable are consistent or proportional across the different thresholds. This means that moving from the lowest category to the next category should have the same relationship with the covariate as moving from the second lowest category to the next category. Since the categories of the two outcome variables studied in this paper have a natural order, this assumption might be expected to hold. However, in the PIAAC survey, the labels corresponding to the categories of the outcome variables were already presented to the respondents when they had to answer the survey questions, due to which the effects of working hours on the outcome variables might not be the same for the different steps of the outcome categories. The proportional odds assumption can be tested in STATA by means of a Brant Test and a Likelihood Ratio Test. The results of the test, presented in Section D, Table D1 in the Appendix, indicate that the proportional odds assumption is violated for both models.

5 Results

5.1 Linear regression results for self-perceived health

The full linear regression results of Model 1 are depicted in Table 2 below.

Table 2. Full linear regression results for Model 1.

Variables	(1) Self-perceived health	(2) Self-perceived health	(3) Self-perceived health	(4) Self-perceived health	(5) Self-perceived health
Weekly working hours	-0.002***	-0.002***	-0.003***	-0.003***	-0.003***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Male	0.084***	0.062***	-0.005	-0.011	-0.034
	(0.023)	(0.022)	(0.034)	(0.034)	(0.038)
Male * Weekly	-0.000	0.000	0.000	0.001	0.000
working hours	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Aged 25 - 34		-0.072***	0.150**	0.058	0.047
		(0.011)	(0.069)	(0.069)	(0.070)
Aged 35 - 44		-0.288***	0.147**	0.019	0.002
		(0.011)	(0.069)	(0.068)	(0.069)
Aged 45 - 54		-0.502***	0.121*	-0.028	-0.048
		(0.011)	(0.070)	(0.070)	(0.070)
Aged 55 plus		-0.648***	0.139*	-0.038	-0.065
		(0.012)	(0.073)	(0.072)	(0.073)
Partner			0.213***	0.185***	0.181***
			(0.016)	(0.016)	(0.016)
Number of children			-0.055***	-0.036***	-0.037***
			(0.005)	(0.005)	(0.005)
Age youngest child			-0.017***	-0.013***	-0.013***
			(0.001)	(0.001)	(0.001)
High school				0.108***	0.106***
				(0.013)	(0.013)
Above high school				0.318***	0.303***
				(0.013)	(0.013)
Flexibility					0.045***
					(0.005)
Male * Flexibility					0.011
					(0.007)
Constant	3.413***	3.745***	3.441***	3.355***	3.270***
	(0.015)	(0.017)	(0.073)	(0.072)	(0.074)
R-squared	0.002	0.052	0.038	0.054	0.060

Root MSE	1.013	0.987	0.995	0.987	0.984
Prob > F	0.000	0.000	0.000	0.000	0.000
Observations	95,657	95,657	38,748	38,738	38,738

Note: Self-perceived health is measured on a 1-5 scale. Control variables: Male, Male * Weekly working hours, Age, Education, Partner, Number of children, Age youngest child, Flexibility, Male * Flexibility.*p < 0.1, **p < 0.05, ***p < 0.01.

With respect to the first outcome variable, the results show that, holding everything else constant, an additional hour worked is on average associated with a 0.003 point drop in one's self-perceived health status, being statistically significant at a 1% significance level. The negative effect of working hours on self-perceived health remains robust when the control variables are gradually added. Hypothesis 1a, which states that working more hours a week leads to a lower self-perceived health status, therefore cannot be rejected. The role of the reported amount of working time flexibility seems to have a relatively large role in shaping self-perceived health outcomes. The corresponding coefficient indicates that a one-point increase on a scale from 1 to 5 in the amount of working time flexibility is on average associated with a 0.045 point increase in self-perceived health status, holding everything else constant. This might imply that having more responsibilities at work does not harm one's health by definition, but that these extra hours are particularly harmful when they collide with other responsibilities, such a family or family care-related ones or other social or individual responsibilities such as friendships or romantic partners.

Significant gender differences regarding this effect of flexibility, possibly due to gender-varying preferences in the way of dealing with neglecting other responsibilities or disappointing people because of increased work-related responsibilities, have not been found. Since being flexible in allocating one's working hours often simplifies balancing various conflicting responsibilities, the flexibility coefficient strongly suggests that scheduling one's work hours flexibly and working a bit more in certain weeks or even days and slightly less in other ones might be a preferred option for the majority of workers in terms of their health over working a constant weekly schedule throughout the entire year. This reasoning is valid under the assumption that working time flexibility can be defined as allocating a fixed number of contractual hours across workweeks- or days. This is a reasonable assumption by looking at the wording of the specific PIAAC survey question.

Furthermore, the interaction coefficients stay insignificant from zero throughout the entire model, implying that significant gender differences in the effect of working hours on self-perceived health cannot be statistically proven. Hypothesis 1b, stating that the decline in self-perceived health due to working more hours a week is greater for women compared to men, will therefore be rejected. When more control variables are added to the model, the age coefficients turn insignificant, whilst on top of this, the sign of the Male coefficient also switches. Most coefficients point into the expected directions of the effects, such as increasingly negative and significant coefficients for the age dummies and increasingly positive and significant coefficients for the education dummies. Perhaps surprisingly, the

age of the youngest child in the household is negatively and significantly correlated with self-perceived health in the full model. This is against the expectation that taking care of younger children requires more time and energy than for older children suggesting that parents of younger children might experience negative health effects, especially if they have to combine the burden of parenthood with work-related obligations.

5.2 Linear regression results for job satisfaction

Table 3 below depicts the complete linear regression results for Model 2.

Table 3. Full linear regression results for Model 2.

Variables	(1) Job satisfaction	(2) Job satisfaction	(3) Job satisfaction	(4) Job satisfaction	(5) Job satisfaction
Weekly working hours	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male	-0.031*	0.029	-0.017	-0.018	-0.028
	(0.019)	(0.019)	(0.029)	(0.028)	(0.032)
Male * Weekly	0.000	0.000	-0.000	-0.000	-0.001
working hours	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Aged 25 - 34		-0.011	0.066	0.021	0.006
		(0.010)	(0.059)	(0.059)	(0.059)
Aged 35 - 44		0.024**	0.097*	0.034	0.011
		(0.011)	(0.058)	(0.059)	(0.058)
Aged 45 - 54		0.028***	0.102*	0.028	0.003
		(0.010)	(0.059)	(0.060)	(0.059)
Aged 55 plus		0.087***	0.187***	0.098	0.061
		(0.010)	(0.062)	(0.062)	(0.061)
Partner			0.101***	0.088***	0.082***
			(0.013)	(0.013)	(0.013)
Number of children			0.007**	0.016***	0.015***
			(0.004)	(0.005)	(0.004)
Age youngest child			-0.003***	-0.001	-0.001
			(0.001)	(0.001)	(0.001)
High school				0.028**	0.026**
				(0.013)	(0.011)
Above high school				0.149***	0.131***
				(0.011)	(0.011)
Flexibility					0.065***
					(0.004)
Male * Flexibility					0.006

					(0.006)
Constant	4.036***	4.007***	3.901***	3.870***	3.741***
	(0.012)	(0.014)	(0.062)	(0.062)	(0.063)
R-squared	0.001	0.003	0.005	0.011	0.025
Root MSE	0.831	0.830	0.825	0.822	0.817
Prob > F	0.000	0.000	0.000	0.000	0.000
Observations	97,703	97,703	38,745	38,745	38,735

Note: Job satisfaction is measured on a 1-5 scale. Control variables: Male, Male * Weekly working hours, Age, Education, Partner, Number of children, Age youngest child, Flexibility, Male * Flexibility. *p < 0.1, **p < 0.05, ***p < 0.01.

Concerning the second outcome variable, the results indicate that, holding everything constant, an additional hour worked is on average related to a 0.002-point drop in job satisfaction, also being statistically significant at a 1% significance level. Accordingly, Hypothesis 2a, stating that working more hours a week leads to lower job satisfaction, will not be rejected. Similar to Model 1, no significant gender differences are observed within the treatment effect, which results in rejecting Hypothesis 2b, which stated that the decline in job satisfaction due to working more hours is stronger for women compared to men. Despite this finding, the coefficients of the remaining control variables mostly tend to point in the expected directions, although a substantial number of coefficients turn insignificant, once more control variables are included.

Although the association is significant for the least extensive specification of the second model, the Male coefficient shows that, holding all other variables constant, women enjoy higher job satisfaction than men, as supported by the literature. The positive and significant effects of living with a partner and the number of children, though small, contradict findings in previous research. Contrary to the literature too, educational attainment is significantly associated with higher levels of job satisfaction. Conditional on all other factors, possessing a higher education degree increases job satisfaction by 0.105 points compared to possessing a high school diploma and by 0.131 points compared to not having a high school degree at all, which is a fairly large effect when comparing it to the effect of working hours. It is, however, conceivable that those with better education qualifications simultaneously and to a greater extent possess other skills related to dealing with conflicting responsibilities and managing stress that are hard to measure and therefore hard to include in the analysis. Hence, the presence of these non-measurable factors might have inflated the coefficients of the education dummy variables.

Lastly, the flexibility coefficient of 0.065 shows an even greater economic significance of this job characteristic in terms of its impact on job satisfaction, which could reflect the fact that working fewer hours could cause workers to quite rapidly perceive their job as more rewarding relative to the opportunity cost of working. This lower opportunity cost of working due to working fewer hours will result in more time and energy spent on various responsibilities and leisure activities, whilst for health,

it might take longer to observe substantial improvements. To a greater extent than job satisfaction, health can be seen as a stock variable or asset that should initially be invested in before it can reach its desired level. Taking time off to excersise for example, will provide employed individuals with a more balanced lifestyle and perhaps more positive perceptions concerning how rewarding their job is. However, for the sake of health improvements, these types of lifestyle adjustments need to be maintained for longer periods of time, such as multiple weeks or months to exert sufficient health effects, such as weight loss.

5.3 Linear regression results by region

In addition to the general linear regression analysis, a heterogeneity analysis was performed in order to check for regional differences within these effects[5]. The full results of this analysis can be found in Section D, Table D1 in the Appendix. The results for Model 1 only show a significant effect of working hours on self-perceived health for Western European and North American countries, although surprisingly, the association is positive. With a coefficient of 0.004, this association is rather small. The most obvious explanation for this surprising finding is the potential non-linear relationship between working time and health, which has already been touched upon quite regularly in the literature. Because workers in these Western countries already systematically work fewer hours than workers from other regions, working an additional hour is on average less harmful to one's health in these Western countries. Similar to the general results, no statistically significant gender differences were found, as the interaction effects were practically close to zero in all regions.

These findings support the stronger associations between working time and symptoms of depression found in Asian countries by Virtanen et al. (2018), but contradict the absence of negative associations between working hours and self-perceived health in Eastern European countries discovered by Altazcoz et al. (2016), which could reveal a preference for balancing out longer working hours with higher income that might be common among citizens of these countries. The results concerning the health outcome could also indicate that certain countries, such as the North American and Western European ones, have made substantially more progress relative to other groups of countries with developing workplace policies that improve work-life balance. These can be things such as regular opportunities for restorative breaks on office days or approaching job psychologists or even something as evident as paid leave policies. Alternatively, along the line of reasoning followed by Virtanen et al. (2018), the varying coefficients might be explained by cultural differences that mirror culturally acceptable norms and values around managing work responsibilities as well as the stress and pressure that come along with it. As mentioned by Virtanen et al. (2018) this could be the fear of appearing 'weak' when considering taking time off or speaking to a counselor or psychologist for example, which is a factor that could trigger or even worsen adverse health effects of working long hours.

[5] Regions such as Africa and the Middle East have been excluded from this heterogeneity analysis, as too few observations (< 200) were available for these regions.

With regard to the effects of job satisfaction, the coefficients were largely in line with the previous results, having negative and significant coefficients for East Asia and the Pacific on the one hand and Central and Eastern Europe on the other. Again, the interaction coefficients are close to zero, implying the absence of gender differences in the job satisfaction effects for all regions. However, the Male coefficients are mostly positive, and confirm the well-established finding in the literature that on average women enjoy higher levels of job satisfaction than men, despite the fact that the coefficients are insignificant.

5.4 Ordered logit regression results

The combined results of the ordered logit regression analysis for Model 1 and 2 are shown in Table 3 below. Again, the main coefficients of interest depicted in Table 3 represent the results for the full model, which includes all control variables.

Table 4. Ordered logit regression results for Model 1 and Model 2

	(1)	(2)
Variables	Self-perceived health	Job satisfaction
Weekly working hours	-0.007***	-0.005***
	(0.001)	(0.001)
Pseudo R-squared	0.022	0.013
Wald chi2	2381.10	1103.80
Prob > chi2	0.000	0.000
Log likelihood	-53,217.217	-44,268.719
Observations	38,738	38,735

Note: Self-perceived health and job satisfaction are measured on a 1-5 scale. Control variables: Male, Male * Weekly working hours, Age, Education, Partner, Number of children, Age youngest child, Flexibility, Male * Flexibility. *p < 0.1, **p < 0.05, ***p < 0.01.

The interpretation of the ordered logit coefficients is vastly different from the linear regression coefficients and therefore incomparable. For that reason, in addition to these ordered logit results, the marginal effects of changes in working hours on both self-perceived health and job satisfaction are presented in Section E, Table E1 in the Appendix. The results from Table 4 reveal for example that a one-unit increase in weekly working hours, one's self-perceived health status is expected to change by -0.007 points in the ordered log odds scale, holding the other variables in the model constant. The results clarify that the treatment effects are also statistically significant for both models.

The average marginal effects for this ordered logit regression can be found in Section F, Table F1 in the Appendix. The coefficients are largely in line with the linear regression results. For the lower levels of self-perceived health and job satisfaction, a one-unit increase in working hours is on average associated with a higher probability of obtaining this specific level. For the two highest levels of both outcome

variables, the pattern is reversed. Besides, all coefficients are statistically significant at the 1% significance level. An important nuance to these ordered logit results is that their reliability is fairly questionable since their main assumption does not seem to hold. The conclusion of this paper will therefore primarily be based on the linear regression results.

6 Conclusion & Discussion

6.1 Conclusion

From a cross-country perspective, this paper has studied the following two main research questions through linear and ordered logit regression analyses:

1. *What is the effect of the number of usual weekly working hours on one's self-perceived health status and to what extent are there gender differences regarding this effect?*
2. *What is the effect of the number of usual weekly working hours on one's job satisfaction and to what extent are there gender differences regarding this effect?*

The results from these regressions emphasize that weekly working hours negatively affect individuals' self-perceived health. Moreover, this association is robust when more control variables are included. However, regional differences in this effect cannot be ignored, especially since a positive and significant association is observed among Western European and North American countries.

This surprising finding could be explained in the light of possible non-linear effects of working hours on job satisfaction as was already briefly touched upon by Bell et al. (2012). Since these Western countries tend to be richer and have lower working time limits (ILO, 2013), working an additional hour might be less harmful to one's health compared to other regions, especially because the nature of these working hours is less likely to be forced compared to other regions such as Asia and Eastern Europe (Artazcoz et al., 2016). The finding is also in line with the stronger mental health effects of working hours found by Virtanen et al. (2018) Nevertheless, gender differences regarding this effect have not been observed, most likely since these regressions failed to control for gender-varying factors that influence health or access to health care. The extent to which women have access to menstrual products and contraceptives is an example. It can thus be concluded that this paper has established a significant negative association between working hours and one's self-perceived health status, in which a stronger effect among women was not found, possibly due to unresolved endogeneity issues.

Concerning the effect on job satisfaction, the results indicate that weekly working hours negatively impact job satisfaction, whilst staying robust when more control variables are included. Compared to the effect on self-perceived health status, the heterogeneity analysis shows that regional differences are less evident since negative and significant associations are observed with respect to two regions, which is more in line with the overall results. This might be explained by the fact that the regressions control for a substantial number of variables that are workplace-related rather than variables that are health or healthcare-related. Gender differences in the effect were not observed either, which leads to the conclusion that a stronger negative effect among women is not present.

6.2 Discussion

Finally, this paper and its methodology have some important limitations. First and foremost, the causal relationships examined in this paper might suffer from reverse causality. It might well be that individuals exhibiting high levels of self-perceived health are to a greater extent capable of working more hours a week than individuals exhibiting lower levels of self-perceived health. The same reasoning goes for the link between working hours and job satisfaction. Since certain individuals are more satisfied with their job, they might be willing to work more hours a week compared to other individuals who are less satisfied with their job for a given salary. This possible reverse causality distorts the evaluation of the health effects of working hours and working time limits for policy purposes.

Next, the two outcome variables studied are rather subjective and vulnerable to the respondents' unique judgment and interpretation, which reduces their reliability to base conclusions. On top of this, both outcome variables were measured on a 1-5 scale and presented with the value labels to the respondents, which could be even more vulnerable to discrepancies in respondents' interpretation than applying a 1-10 scale without value labels for example.

Besides, this paper could only take into account self-perceived health status, since this was the only health-related variable available in the dataset. Since this will most likely be viewed by the respondents as a long-run state, rather than a short-run snapshot, the health effects might tend to show a lower economic significance than they might actually have and therefore give a distorted picture of the actual situation. Furthermore, it is unclear which facets of health exactly are affected by changes in weekly working hours and whether these facets pertain to physical or mental health since the health variable used in this study captures self-perceived physical and mental health jointly.

This drawback naturally leads to a suggestion for future research. Since this paper only looked at differences in (long-run) overall health status among countries and whether these could be contributed to differences in working hours, more insightful knowledge could be obtained when the effect of working hours on short-run health behaviors, such as smoking, drinking, exercise and sleep, would be examined in a cross-country analysis. Ideally, this would be done by comparing two or more countries with different legal maximum weekly working hours. Short-run mental health effects of working hours,

such as time for social activity and friendships or relationships, would be particularly important to examine, as these are still underexposed in the academic literature.

Since this paper takes into account the effects for employed individuals only, it only looks at the intensive margin. It would also be interesting to examine the effects develop along the extensive margin for individuals who were previously not employed but start working at some point in time for a certain sample. These results can then be related to intensive margin results for the same sample to see whether they significantly differ. Gender differences regarding extensive margin health effects have also been discussed as a realistic possibility in the literature, which would make it even more relevant as a suggestion for future research (Akerlof et al., 2000; Berniell et al., 2012).

Additionally, the analysis of both health and job satisfaction effects could be extended by employing the *hedonic wage function* framework*,* which is a widely applied microeconometric model to examine to what extent workers desire to be compensated in exchange for accepting certain job disamenities, such as long working hours or risking injury or health problems, to stay indifferent between this alternative option and the default option (Kinoshita et al., 1987; Liu et al., 1997). In terms of job satisfaction, this could be a research that examines how much workers want their salary to increase in exchange for accepting working longer hours, conditional on obtaining a given level of satisfaction or utility from being employed in a certain job.

Concluding, the results obtained and the conclusions drawn in this paper imply that both negative health and job satisfaction effects of working hours might be more prevalent in the long run rather than in the short run. Nevertheless, this implication is only valid under the restrictive assumption that overall physical and mental physical is representative of health outcomes only and should therefore be regarded with care. The lack of gender differences found in the association between working hours and health implies should make policymakers somewhat hesitant to modify working time legislation according to gender. This is even further confirmed by the absence of gender differences found in the effect of the degree of working time flexibility.

Even so, potential endogeneity issues make it hard to disentangle the interaction effect between gender and working hours and the effect of other cultural or institutional factors that lead to gender differences in the effects on health or access to health care for example. This could be a factor as simple as the level of bureaucracy in a country, which is a macro-level variable and therefore difficult to control for in a regression analysis entirely based upon micro-level variables. Despite their small magnitude, the significant health effects found, especially the ones observed in the heterogeneity analysis, should warn policymakers about the negative health effects of their working time limiting policies and encourage them to take appropriate action, especially the ones in countries where these limits are currently on the high side.

As job satisfaction, on the other hand, can be seen as a higher goal for individuals to pursue themselves rather than a concrete objective legislators ought to facilitate, implications of the corresponding results will need some nuances. Because the results have shown that other factors than working hours might have a stronger influence on job satisfaction, the impact of working time on job satisfaction should not be necessarily be prioritized over other factors that can be changed by either employers or employees, such as working time flexibility. Lastly, although it might seem an unsatisfactory deduction, what constitutes a 'good' job will vary greatly among individuals. This makes it nearly impossible to draw generalized conclusions about how certain job amenities shape the level of job satisfaction a worker enjoys. For that reason, successfully examining job satisfaction effects is therefore best served by a preference and utility-based, microeconomic or microeconometric approach.

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Appendix

A Descriptive statistics

Table A1. Sample characteristics for all relevant variables (%)

Variable	Males (1)	Females (2)
Self-perceived health		
Excellent	17.23	16.02
Very good	30.04	29.61
Good	35.18	35.18
Fair	15.76	17.10
Poor	1.80	2.09
Job satisfaction		
Extremely satisfied	23.56	26.16
Satisfied	54.90	53.04
Neither satisfied nor dissatisfied	15.59	15.16
Dissatisfied	4.71	4.44
Extremely dissatisfied	1.23	1.20
Weekly hours worked		
0 – 20 hours	5.52	13.13
21 – 40 hours	45.84	59.02
41 – 60 hours	41.88	24.91
61 – 80 hours	6.07	2.58
81 – 100 hours	0.61	0.28
More than 100 hours	0.08	0.07
Age		
< 25	10.11	8.95
25-34	23.52	22.59
35-44	25.65	26.57
45-54	23.84	25.30
> 54	16.88	16.59
Education		
Below high school	18.94	13.38
High school	37.59	32.66

Above high school	40.97	51.50
Spouse / Partner	76.15	69.36
Children	66.25	71.53
1 child	25.05	26.66
2 children	44.07	44.83
3 children	19.69	18.96
4 or more children	11.20	9.54
Flexibility		
Not at all	30.96	36.66
Very little	17.44	17.71
To some extent	22.14	22.09
To a high extent	15.67	13.13
To a very high extent	13.79	10.41

Note: This table presents descriptive statistics for all relevant regression variables for both males (Column 1) and females (Column 2) respectively. All variables are expressed in percentages.

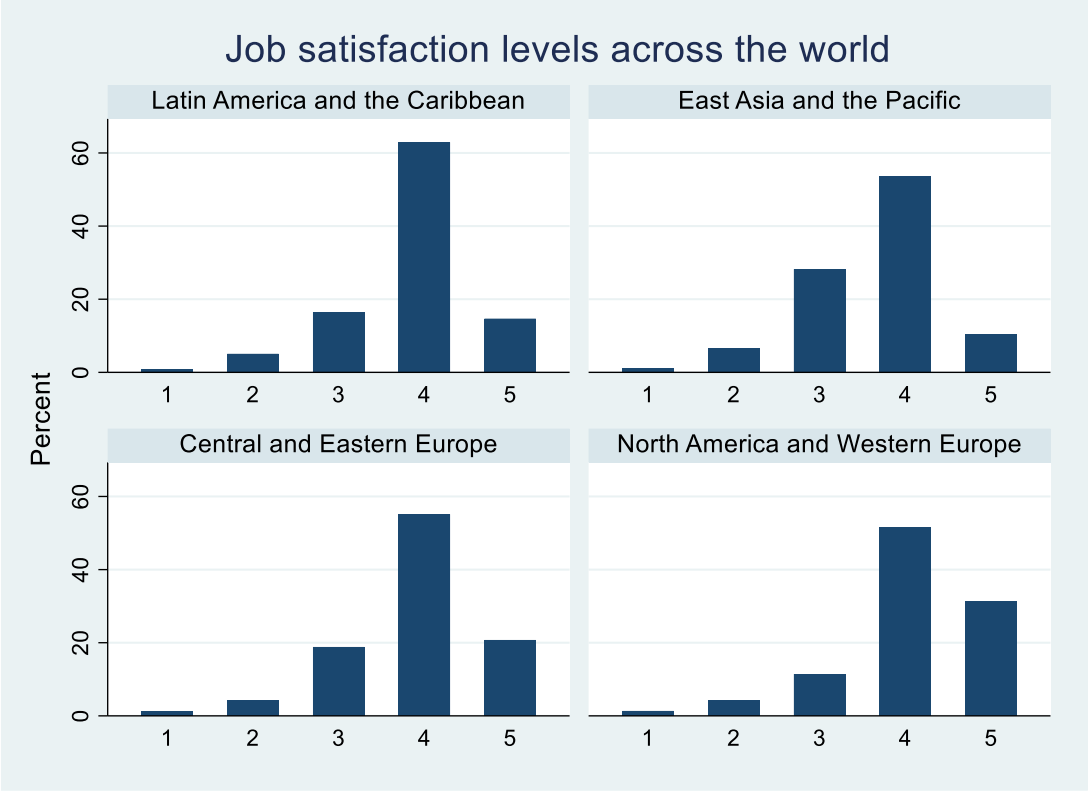

Figure A1. Distribution of job satisfaction levels across four regions, with the levels depicted on the x-axis and the percentages depicted on the y-axis. Job satisfaction is measured on a 1-5 scale, in which 1 = 'Very dissatisfied' and 5 = 'Very satisfied'.

B Assumptions linear regression

Linearity assumption

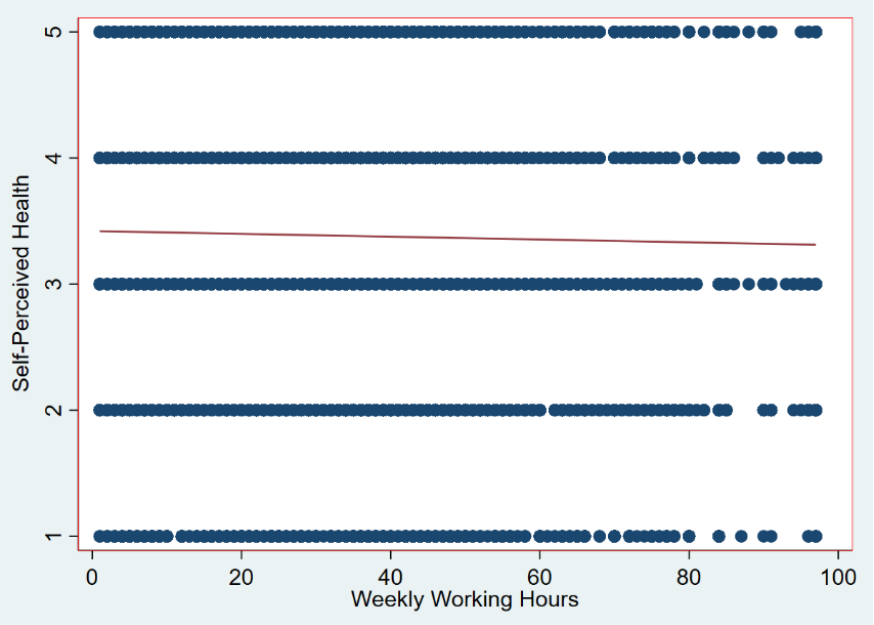

Figure B1: Scatterplot of Self-Perceived Health vs.Weekly Working Hours

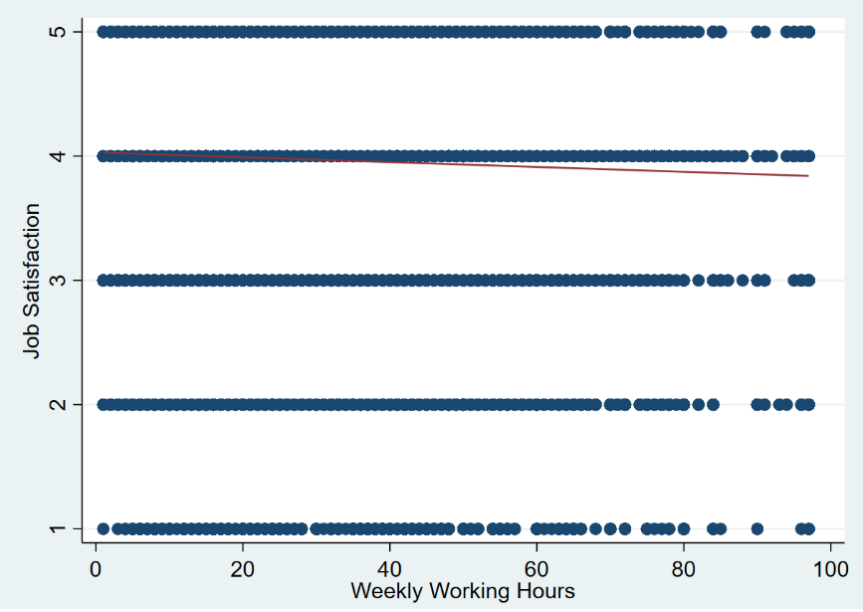

Figure B2: Scatterplot of Job Satisfaction vs. Weekly Working Hours

Homoskedasticity of residuals assumption

Table B1. Breusch-Pagan Test: Model 1

	Coef.
Chi-square test value	19.79
P-value	0.000

Note: the null hypothesis states that there is no constant variance among the residuals.

Table B2. Breusch-Pagan Test: Model 2

	Coef.
Chi-square test value	21.79
P-value	0.000

Note: the null hypothesis states that there is no constant variance among the residuals.

Normality of residuals assumption

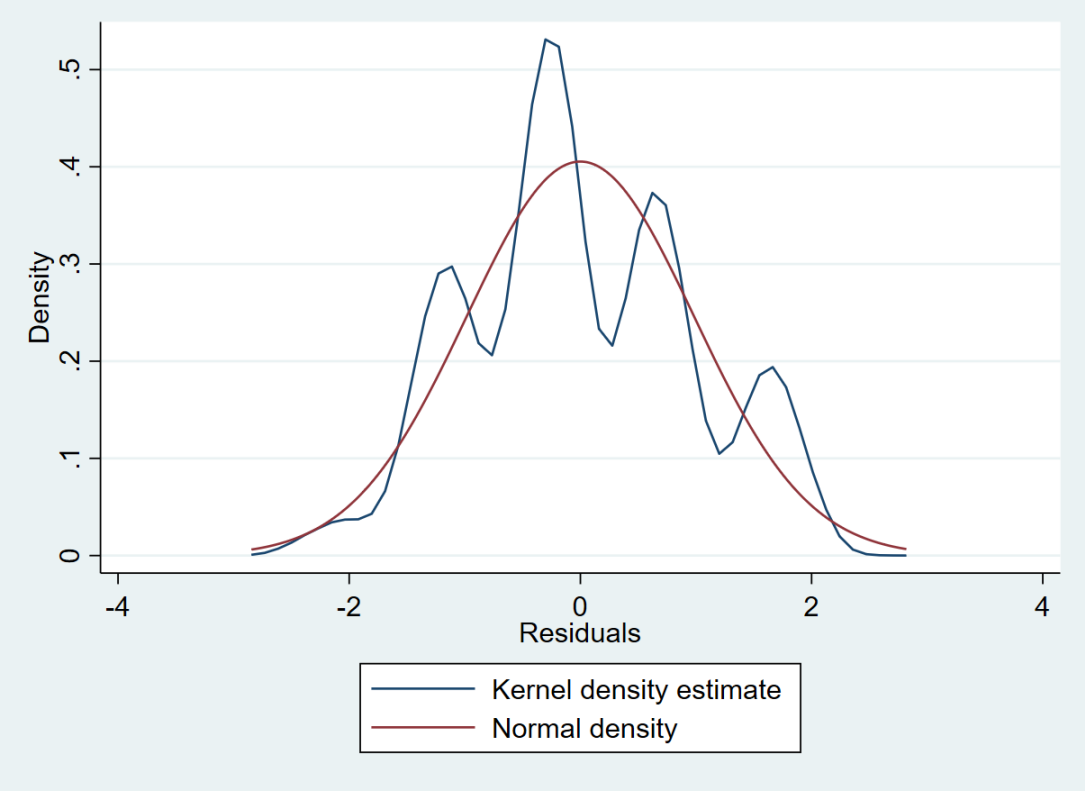

Figure B3: Results for the normality of residuals between self-perceived health and weekly working hours

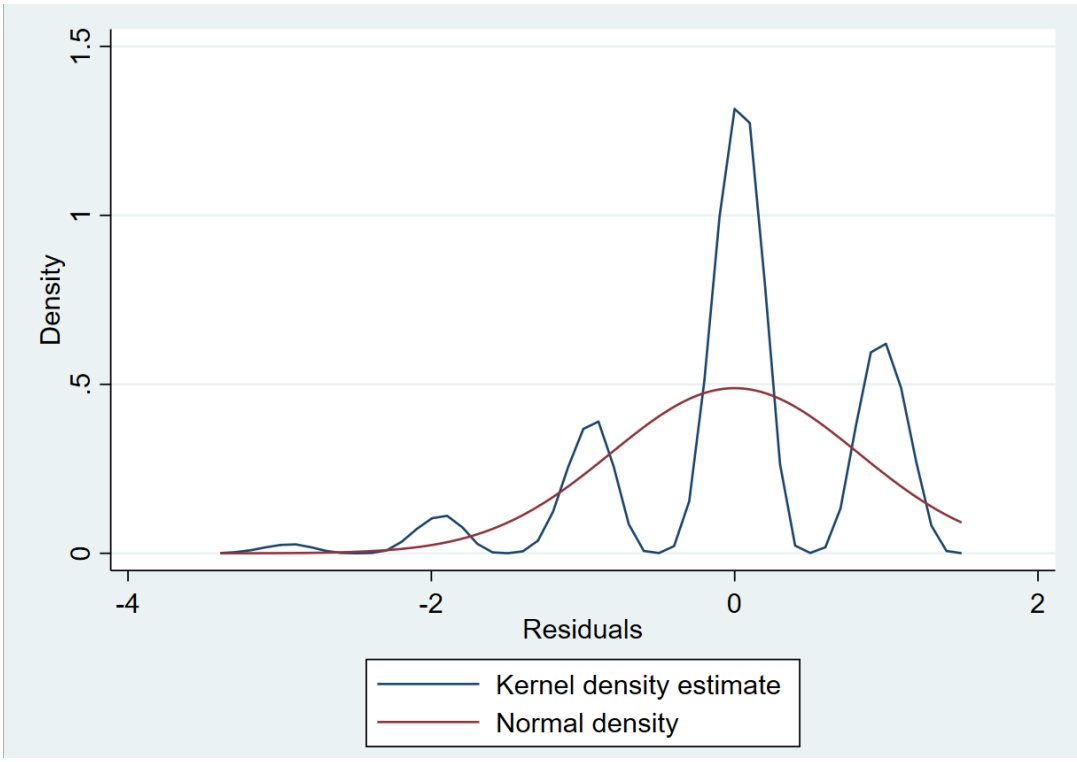

Figure B4: Results for the normality of residuals between job satisfaction and weekly working hours

No perfect multicollinearity assumption

Table B3: Correlation matrix for all regression variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Self-perceived health	1.000						
(2) Job satisfaction	0.182***	1.000					
(3) Working hours	-0.015***	-0.031***	1.000				
(4) Male	0.024***	-0.022***	0.242***	1.000			
(5) Male * Working hours	0.024***	-0.029***	0.498***	0.920***	1.000		
(6) AgeCat2	0.112***	-0.030***	0.030***	0.012***	0.022***	1.000	
(7) AgeCat3	0.015***	-0.002	0.025***	-0.001***	0.004	-0.316***	1.000
(8) AgeCat4	-0.085***	0.012***	0.020***	-0.016***	-0.001**	-0.305***	-0.330***
(9) AgeCat5	-0.127***	0.040***	-0.052***	0.004	-0.013***	-0.239***	-0.259***
(10) Partner	-0.003	0.074***	0.029***	0.076***	0.093***	-0.077***	0.103***
(11) Children	-0.149***	0.045***	-0.003	-0.028***	-0.010***	-0.271***	0.102***

(12) Age youngest child	-0.175***	0.006	-0.061***	-0.104***	-0.120***	-0.402***	-0.479***
(13) High school	-0.033***	-0.034***	0.033***	0.053***	0.059***	-0.028***	-0.030***
(14) Above high school	0.097***	0.045***	0.003	-0.088***	-0.080***	0.080***	0.036***
(15) Flexibility	0.066***	0.129***	0.023***	0.075***	0.084***	-0.024***	0.016***
(16) Male * Flexibility	0.040***	0.041***	0.206***	0.791***	0.732***	-0.005*	0.001

Variables	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(8) AgeCat4	1.000						
(9) AgeCat5	-0.249***	1.000					
(10) Partner	0.117***	0.132***	1.000				
(11) Children	0.209***	0.236***	0.364***	1.000			
(12) Age youngest child	0.148***	0.662***	-0.025***	-0.035***	1.000		
(13) High school	-0.010***	-0.024***	0.065***	-0.009***	0.025***	1.000	
(14) Above high school	-0.018***	-0.042***	0.042***	-0.010***	-0.102***	-0.568***	1.000
(15) Flexibility	0.003	0.036***	0.074***	0.042***	-0.016***	-0.057***	0.067***
(16) Male * Flexibility	-0.006*	0.025***	0.097***	0.005	-0.080***	0.007**	-0.022***

Variables	(15)	(16)
(15) Flexibility	1.000	
(16) Male * Flexibility	0.508***	1.000

Note: Self-perceived health and job satisfaction are measured on a 1-5 scale. Age is split up into the dummy variables AgeCat2 (25-34), AgeCat3 (35-44), AgeCat4 (45-54), AgeCat5 (55 plus) and AgeCat1 (<25) as the reference category.
*p < 0.10, **p < 0.05, ***p < 0.01.

C Assumptions ordered logit regression

Table C1. Results of testing for the proportional odds assumption for Model 1 and Model 2.

	(1) Model 1	(2) Model 2
	Prob > chi^2	Prob > chi^2
Brant test	0.000***	0.000***
Likelihood-ratio test	0.000***	0.000***

Note: Collumn 1 and 2 present the results of the tests mentioned above for Model 1 and Model 2 respectively. *p < 0.1, **p < 0.05, ***p < 0.01.

D Linear regression results

Table D1. Linear regression results for Model 1 and Model 2, by region

Variables	(1) Self-perceived health	(2) Job satisfaction
Latin America and Caribbean		
Weekly working hours	0.000	0.000
	(0.001)	(0.001)
Male	0.157**	-0.032
	(0.072)	(0.063)
Male * Weekly working hours	-0.000	0.001
	(0.001)	(0.001)
Constant	2,822***	3.723***
	(0.098)	(0.082)
R-squared	0.077	0.010
Root MSE	0.886	0.757
Prob > F	0.000	0.000
Observations	7,314	7,312
East Asia and the Pacific		
Weekly working hours	-0.001	-0.002**
	(0.001)	(0.001)
Male	0.015	-0.129
	(0.090)	(0.079)
Male * Weekly working hours	-0.000	0.000
	(0.002)	(0.001)
Constant	3.384***	3.477***
	(0.281)	(0.208)
R-squared	0.047	0.024
Root MSE	0.898	0.781
Prob > F	0.000	0.000
Observations	5,535	5,533
Central and Eastern Europe		
Weekly working hours	0.000	-0.002*
	(0.001)	(0.001)

Male	0.089	0.005
	(0.079)	(0.076)
Male * Weekly working hours	0.000	-0.001
	(0.002)	(0.002)
Constant	3.511***	3.821***
	(0.166)	(0.168)
R-squared	0.104	0.028
Root MSE	0.840	0.771
Prob > F	0.000	0.000
Observations	8,590	8,586
North America and Western Europe		
Weekly working hours	0.004***	-0.000
	(0.001)	(0.001)
Male	-0.060	-0.038
	(0.038)	(0.052)
Male * Weekly working hours	0.001	-0.001
	(0.001)	(0.001)
Constant	3.626***	3.821***
	(0.134)	(0.136)
R-squared	0.046	0.045
Root MSE	0.957	0.831
Prob > F	0.000	0.000
Observations	17,299	17,304

Note: Self-perceived health and job satisfaction are measured on a 1-5 scale. Control variables: Male, Male * Weekly working hours, Age, Education, Partner, Number of children, Age youngest child, Flexibility, Male * Flexibility. *p < 0.1, **p < 0.05, ***p < 0.01.

E Ordered Logit Regression – Marginal Effects

Table E1. Marginal effects regarding the relationship between weekly working hours and self-perceived health and the relationship between weekly working hours and job satisfaction

(1)		(2)	
Self-perceived health	Weekly working hours	Job satisfaction	Weekly working hours
Poor	0.0002***	Extremely dissatisfied	0.0001***
	(0.0000)		(0.0000)
Fair	0.0010***	Dissatisfied	0.0002***
	(0.0002)		(0.0000)
Good	0.0004***	Neither satisfied nor	0.0006***
	(0.0001)	dissatisfied	(0.0001)
Very good	-0.0008***	Satisfied	0.0001***
	(0.0001)		(0.0000)
Excellent	-0.0008***	Extremely satisfied	-0.0010***
	(0.0001)		(0.0002)

Note: Self-perceived health and job satisfaction are measured on a 1-5 scale. Average marginal effects represent the average change in probability when either self-perceived health or job satisfaction increases by one unit as a dependent variable. Column 1 represents Model 1 and Column 2 represents Model 2. In order to make interpretation of the coefficients easier, they are rounded off to four decimals. Control variables: Male, Male * Weekly working hours, Age, Education, Partner, Number of children, Age youngest child, Flexibility, Male * Flexibility. *p < 0.1, **p < 0.05, ***p < 0.01.