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Abstract

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1   Introduction

Since the beginning of the covid-19 pandemic early 2020 many workers have been forced to work from home. They had to set-up a home-office, rely on their own internet connection, sharing their home with children, who were forced to study and follow lessons from home, and share the house with a working partner, who also needed to work from home in a home-office. Some of these workers were ample supported by their employer in setting up a decent home-office, providing equipment like office-chairs, mobile phones and laptops and sometimes even an extra financial compensation, to compensate for the extra costs of the home-office, like coffee and electricity. Other workers had to set up the home-office by themselves and hardly got any help at all. How this sudden and forced change affected the well-being of the workers is not known and not well understood. One important reason for this poor understanding is, that we actually know little about the effect of home-office on well-being in general.

Although working from home or outside the office, known under labels like telecommuting, teleworking or remote working, is already a practice applied for decades, research about the effect of the home-office on subjective well-being is scarce. One of the few recent examples are Felstead and Henseke (2017), Gschwind and Vargas (2019), Beauregard, T. A. et al. (2019). And of these only Felstead and Henseke (2017) use multi-variate analyses to answer their research question. Gschwind and Vargas (2019) use a large scale data set, the EWCS, to present some data on incidence and intensity of working at the home-office, but do not perform multi-variate analyses to test any hypotheses.

Telecommuting or teleworking have been defined in various ways. In this research we follow the definition of Allen et al. (2015) who define telecommuting as a work practice that involves members of an organization substituting a portion of their typical work hours (ranging from a few hours per week to nearly full-time) to work away from a central workplace—typically principally from home—using technology to interact with others as needed to conduct work tasks. This excludes remote work, which takes place at different business units, like construction work, or while travelling for business purposes.

In this paper we want to investigate how the compulsory work at the home-office affected subjective well-being of the workers. To answer this question we want to compare the change in subjective well-being of home office workers and on-site workers between 2015 (on basis of the EWCS2015) and 2020 (on basis of the Living, working and COVID-19 data set) both from Eurofound[1]. Has it changed and if so, by how much? Furthermore we want to explain the changes.

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[1] For information about Eurofound and their data sets see: https://www.eurofound.europa.eu/

Due to the covid-19 pandemic we should see a double growth in home-office work. Due to the more or less compulsory character of working at the home-office we can expect to see an increase in the number of workers working at home (incidence) and an increase in the number hours spend in the home office (intensity). Instead of working one or two days at home, workers now spend the entire workweek at home. This change in incidence and intensity at the home-office will affect their subjective well-being.

To explain the changes we will build a theoretical model on basis of the Self-Determination Theory (Ryan and Deci 2000) and the effects of non-monetary incentives on subjective well-being (Cassar and Meier 2018). In the next section we will develop a model that relates work and working conditions on well-being. In a next step we model how these circumstances affect the well-being of the home-office workers and in a final step we model the changes caused by the COVID-19 pandemic. On basis of these models we formulate some hypotheses that we will test using the European Working Conditions Survey held in 2015 and the Living, working and COVID-19 data set from 2020/21, both from Eurofound. We present the results of our analyses in section four and finally we will draw some conclusions.

2 Well-being and work

Different researchers from various scientific disciplines have investigated well-being at work. Psychologists were among the first to do so. An early example is the human relations movement (Mayo Elton 1946) and later on Hackman and Oldham (1980) with their famous job characteristics model. Sociologist like Karasek (1979) contributed too, with a model based on job demands and job resources. Still later, economists like Clark (1997), Sousa-Poza and Sousa-Poza (2000) added a more economic perspective. In this paper we lean heavily on the model proposed by Cassar and Meier (2018) who draw on the Self Determination Theory by Ryan and Deci (2000). The model is an extension of the standard neo-classical economic labour supply model that incorporates nonmonetary incentives next to the monetary ones.

Cassar and Meier (2018) argue that subjective well-being of workers first of all depends on their wages and level of effort, like in the standard neo-classical labour supply model, and secondly on the meaning of the job. The meaning of the job captures the most important non-monetary incentives to do the job. The main non-monetary incentives consist of the three basic psychological needs: autonomy, competence and relatedness as formulated in the Self Determination Theory of Ryan and Deci (2000) and, additionally, the purpose of the job. 'A job where I can make an impact' is an important aspect of many people's jobs. This was already recognized by Hackman and Oldham (1980) in their Job Characteristics Model, who named it task significance.

The wages represent all types of monetary rewards from the job. Total income depends on the hourly wages, hours worked and other monetary incentives. Effort depends on the hours worked and

the total work load. Sometimes someone is being asked to do some extra work in the same amount of time, and sometimes the workload is somewhat lesser, depending on the demands of the employer.

In this theory autonomy 'refers to volition – the organismic desire to self-organize experience and behavior and to have activity be concordant with one's integrated sense of self' (Deci and Ryan 2000). In that sense it differs from locus of control, because it refers to being able to decide what to do, how to, when to and where to do, commonly used measures of autonomy. There is ample evidence that workers who have a high level of autonomy, but also involvement or empowerment, report high levels of subjective well-being (Van der Meer, Peter H. and Wielers 2013, Benz and Frey 2008, Schneck 2014, van der Meer 2018). It also is a basic part of the job characteristic model of Hackman and Oldham (1980), that sees job satisfaction as one of the major outcomes.

The second basic need is competence. Competence is about showing and developing skills. A feeling of competence arises when one is able to show one's skills and abilities, not only at work but also in general. In general people like to engage in activities in which they are good (Loewenstein 1999). People also would like to improve their competences, so they like opportunities for skill development and training activities. If people don't feel competent, they would like to increase their competence, i.e. by mastering the trade.

Relatedness is about entering or being in meaningful relationships with other people. People want to be respected and have good relationships within their communities, one of which is the organisation they work in. They would like to have a feeling of belonging. The more the job contributes to relatedness, the greater the intrinsic motivation to do the job. People are social beings and want to relate and connect to other people. Social identity theory argues that workers who identify with their colleagues, managers and goals of their organization will be more productive (Akerlof, George A. and Kranton 2005, Akerlof, George A. and Kranton 2008). People want to be seen and to belong to a group. If this group is part of an organisation then it will increase their productivity. People will do their best for the group to create a sense of belonging and relatedness.

Cassar and Meier (2018) add purpose as a fourth factor to these three basic psychological needs. People would like to make an impact and this impact can be quite diverse. It appears to overlap with the notion of 'task significance' of Hackman and Oldham (1980), but the concept defined by Cassar and Meier is somewhat broader. It explicitly includes having a positive impact on society at large. In that sense they follow Martela and Pessi (2018) and Lepisto and Pratt (2017), who discuss social usefulness as one of the factors giving meaning. So the impact can be on other persons, but also on society at large. Cassar and Meier, and Lepisto and Pratt describe evidence that workers except lower wages in organisations that have an explicit purpose, like NGO's. But it could also hold for for-profit organisations with a clearly stated mission. Organisations that pay their workers a lower wage, are still seen as attractive employers, because these organisations make an impact, thereby giving their employees a feeling of purpose. This follows Martela and Pessi (2018) who distinguish between self-

realisation, conform the SDT and a broader purpose, a contribution to some greater good, beyond one owns benefits.

2.1   Working at the home-office

How does working at the home-office affect the well-being of workers compared to other workers? To answer this question we need to know how working at the home-office affects the determinants of well-being. First of all we do not expect that income or wages are affected by the home-office. Most office-workers still receive a monthly salary. So, the income only depends on the contractual hours worked, be it full-time or part-time. Next to that, the evidence of the effect of the home-office on performance and productivity is mixed.

On the one hand we see an increase in working hours (Felstead and Henseke 2017). Home-office workers work longer hours when working at the home-office than when working at the office. These longer hours can be seen as a 'gift' from the worker to the employer in exchange for the possibility to work at home (Akerlof, G. 1982). Home-office workers can work longer hours, because they save commuting time (Beauregard, T. A. et al. 2019) and excessive commuting time is seen as undesirable (Stutzer and Frey 2008). One reason for the workers to expand their working hours is because they are more flexible in when to work. They do not need to work during the official office hours, but can work outside these hours, expanding their working day (Beauregard, A. et al. 2013). This also has a negative effect, because the boundaries between home and work are being blurred, which in the end can have a negative effect on performance due to a negative work-life balance (Charalampous et al. 2019). The effect also differs between men and women and depends on the presence of children in the household, too (Arntz et al. 2019).

Monteiro et al. (2021) report a negative effect of remote work on productivity, due to blurring boundaries and social and professional isolation. This negative effect might also depend on the number of hours people work at the home-office. Allen et al. (2015) report a curve-linear effect of number of hours worked at the home-office on job satisfaction. Approximately fifteen hours per week appears to be the optimum. Workers working less and more hours at home are less satisfied. The relative decrease in satisfaction of the full-time home-office workers is caused by the blurring boundaries between home and the home-office and the increased workload due to the increased number of hours worked. However, we do not expect any changes in earnings, due to the home-office.

Most researchers (Beauregard, T. A. et al. 2019, Felstead and Henseke 2017, Allen et al. 2015) agree that working at the home office increases autonomy. Especially one aspect of autonomy is being improved, and that is the increased control over working hours. Home-office workers have a bigger say in when to do the job. They have more flexible working hours so they are more able to balance the working hours with hours spend on other activities. Giménez-Nadal et al. (2020) report

that fewer than 60 per cent of teleworkers work only at regular hours and experience lower levels of negative feelings, based on a longitudinal American time-use study.

Home-office workers also have higher levels of autonomy in the sense that they have more control over how to do the job (Kelliher and Anderson 2008, Tietze and Musson 2005). For organisations to make the home-office a success it is a prerequisite that managers steer on output instead of input (Beauregard, T. A. et al. 2019). So managers need to change their management style from behaviour-based control to output-based control. This increases the control of the home-office workers on how to do the job and thereby their autonomy.

How home-office work affects the feeling of competence is unsettled. On the one hand they have to master new skills, i.e. working with IT-equipment and software that makes working at the home-office possible (Gschwind and Vargas 2019). Also the increased autonomy might require some new skills and abilities, i.e. time-management skills to handle the increased flexible working hours. Opposite to that stands the opportunity for further development and promotion. This argument holds especially for full-time-office workers. They have fewer contacts with colleagues, so have fewer opportunities of knowledge transfer, i.e. fewer opportunities to learn from their colleagues, that could increase their competence. A second negative effect is that they are less seen by their managers and might be overlooked for promotions. Due to their absence they are not visible, and therefore overseen. May be the home-office workers fail to see the promotion opportunity, because they are absent or they might be overlooked by their manager. Out-of-sight is out-of-mind according to Beauregard, A. et al. (2013) with possible negative effects for further development and promotions.

Another aspect is how relatedness affects the home-office worker. This has several aspects, related to both the work and the home situation. Considering work, it is to be expected that the feeling of relatedness among the home-office workers decreases. This holds especially for full-time home-office workers. They have fewer in-person contacts with their colleagues and boss. In one sense this is an advantage because they are less disturbed and thus more able to focus on their own tasks, increasing their productivity in the short run, but the feeling of social isolation dominates (Golden 2006). This would favour part-time home office work above full-time home-office work. Next to the feeling of social isolation home-office workers also feel professionally isolated. Due to the fewer contacts, the possibilities for knowledge transfer are smaller. There is just less opportunity to learn from colleagues, due to fewer and shorter interactions. Home office workers have no short social informal contacts at the coffee machine with their colleagues anymore which hinders knowledge transfers. This leaves them professionally isolated (Beauregard, T. A. et al. 2019).

A further aspect is the relation with the manager. Due to home-office work the relation with the manager might improve, although evidence is mixed and this might be dependent on the number of hours spend at the home-office. Because managers need to change their management style, they need to create a trust relationship with the home-office worker (Beauregard, A. et al. 2013), to make home-office work. This should improve the relation between the manager and the home-office worker. On

the other hand it is sometimes reported that home-office workers have the feeling that being out-of-sight is out-of-mind which should have a negative effect on the relationship, but this depends on the number of hours spend at the home-office.

On the other side relatedness at home might improve. Home-office workers report an increase in the work-life balance (Beauregard, T. A. et al. 2019). Due to less commuting time and flexible working hours, they are able to spend more hours or more quality time with their family members. Urgent home duties can be performed during normal office hours. This increased work-life balance should improve the relationships at home. However, the increased working hours and blurring of the boundaries have a negative effect on work-life balance. This, again, depends on the total hours spend at the home-office.

With regard to purpose, we do not expect an effect for home-office workers, because workers do not change their job or employer, only the place of work. The place of work does not affect the broader purpose, that merely depends on the job, the organisation, and type of services and products. We also have no further knowledge due to lack of research. Research about the effect of purpose on well-being, or the meaningfulness of work is scarce, but the effect is rather strong (Van der Meer and Wielers, 2022).

On basis of the arguments and empirical results presented above we expect that home-office workers have a higher level of well-being than normal office workers, mainly due to increased autonomy and an increased work-life balance. A further argument for this hypothesis is the voluntary nature of working at the home-office. Only workers who want to work at the home-office are doing so. Nobody is forced to work at the home-office. However, this hypothesis depends on the number of hours worked at the home-office. The effect of number of hours worked at the home office is curve linear, implying that workers who work only a small number of hours or a large number of hours at the home-office have lower well-being than home-office workers who work only partially at the home office. Also longer working hours at the home-office can have negative effects on work-life balance. On basis of the EWCS 2015 we are going to test how the home-office affects well-being, if this is mediated by meaning of the job, including the number of hours worked at the home-office and work-life balance.

2.2   The pandemic and the home-office

In early 2020 home-office work became mandatory in all European countries and other places in the world. Everyone who could do their job at the home-office was forced to do it at the home-office, in order to limit the amount of in-person contacts to control the pandemic. It was no longer voluntary and an opportunity provided by the employer, but mandatory. All those who could, should work at home and employers should make that possible. This forced change has increased both the incidence of home-office work as well as the intensity of home-office work. More people did it, not only those who

wanted to and were allowed to do it, but now just everyone who could. Also people worked longer hours at the home-office. Instead of working partially at home and partially at the office many people started to work full-time at the home-office. The question than arises: how did this change affect the well-being of the workers? In order to make predictions we have to predict how the determinants of well-being have changed due to the pandemic.

Of course, we have to consider that the lock-down affected the lives of everyone. Not only were the jobs and work affected, but also the social lives were severely hampered by the lock-down. It was impossible to go out, visit friends and family, having diner, visit bars and cafes, going to the movies or theatres, but also the ability to do sport was limited. Team sports were prohibited, so you could only get involved in individual sports like walking, jogging, cycling. So, the overall effect of the pandemic on everyone's subjective well-being will have been negative. For the rest of our argument, we have to assume that this general negative effect, affects everyone in more or less the same way, depending on age and other personal characteristics for which we have to control in our empirical analysis.

Wages and salaries of those who remained at work did not change. In many cases in Western-Europe the national governments financially supported the firms and organisations that were shot down, to be able to pay the wages and salaries. Besides that, the organisations that could operate their business in a more or less normal way, stayed open and could keep on paying, what they used to pay. This holds surely for the forced home-office workers. Some businesses, like accommodation and food service activities (NACE code I) and the cultural sector were forced to shut down completely, but still could pay wages funded by the governments. It could have had an effect on their employment, reducing the number of employees, but not so much the amount of pay. For our population of interest, the office workers, we can expect that labour income did not change.

Does effort change? Probably the effort did increase. We know that full-time home-office workers work longer hours than part-time home-office workers and normal office workers (Felstead and Henseke 2017). They can put in longer hours due to the saving of commuting time. Effort, and also work-load might have increased because workers, especially those that did not work at the home-office before, needed to learn to work at the home-office to become at least as productive as before the pandemic. So, the perceived workload and work pressure might have increased. Contrary to that, is that managers needed to learn how to manage all these home-office workers. So initially, during the start-up, workload might have been a bit lower, but after some adjustment time it might have increased due to longer working hours. The forced changes might have caused the perceived work pressure to have increased. These increased working hours will have had a negative effect on work-life balance and on subjective well-being.

We also expect that the home-office workers perceived an increase in autonomy. Working at home makes it possible to be more flexible with the working hours and it also increases the possibilities to do the work as one wishes. Managers have less sight of what and how the workers are

doing their job and need to change their management style. This offers home-office workers more autonomy. Not all managers were willing to change their management style and we see a steady increase in surveillance software, tracking the behaviour of the home-office workers[2], but all in all we expect to find an increase in autonomy.

The feeling of competence might also have changed. Workers need to learn to use IT-equipment and software at the home-office to communicate with colleagues and customers (i.e. help-desks). It is difficult to say if that improved the feeling of competence. That depends on how many skills were already available, and how many new skills had to be mastered. We know that home-office workers need other skills. This can improve their competence, in the sense that they now use skills they possess, but were hardly used before, and in the sense that they needed to learn new skills. So, they have new learning opportunities. Teachers needed to learn to teach in a virtual, online, classroom. Customer contacts were with the help of zoom and other similar software. Workers needed to learn how to work safely in the cloud. Workers, certainly at the early stages of the pandemic, needed to improvise. Further official training and development activities might have become more difficult. And there is no way to tell how the forced home-office affected (perceptions of) promotions. However, there was less room for knowledge transfers, due to fewer physical contacts with colleagues. This is more harmful for workers who are part of an interdependent team (Lazear and Gibbs 2009), and who are in early stages of their career, or just recently joined the organisation. Considering these thoughts it is difficult to predict what the forced home office did with competence. In the end it is an empirical question.

We expect that the feeling of relatedness has decreased. Working full-time at the home-office comes with both social and professional isolation (Golden 2006). Workers are less often disturbed by their colleagues and do not see their colleagues at the coffee-machine, decreasing both personal, social as well as professional contacts. So there are fewer walk-inns and fewer social and professional meetings. This decreases the feeling of relatedness. It is more difficult to predict how the relation with someone's manager changes. This depends on the management style and depends on the ability of the manager to change his style to a more output-based control one. This might be difficult, because the manager might find the new situation stressful. We know that firms and organisations increasingly use tracking software to control the workers at the home-office, implying that managers do not like to change their management style, see footnote 2.

It is difficult to predict what the forced home-office did to work-life balance. We have to distinguish between a few different situations, depending on the presence of partners and children. For a person living alone work-life balance might have improved, due to the avoidance of commuting and

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[2] See: https://www.cnv.nl/nieuws/half-miljoen-thuiswerkers-via-software-in-de-gaten-gehouden/, https://www.theguardian.com/us-news/2021/sep/05/covid-coronavirus-work-home-office-surveillance.

the increased flexibility in working hours while it has become worse for persons with partners and/or children. We will use the situation at home only as a control variable.

Do mandatory home-office workers feel a change in purpose? The workers did not change jobs or employers, so we do not expect big changes. Although it might be that workers in designated essential occupations, industries and processes might have become more aware of their purpose, because they have been designated as essential by the government. Nurses and other caring personnel even did get a few rounds of applause and might have felt more appreciated. But many of these designated essential workers are not the home-office workers. Most of these designated essential workers still worked at their normal location. So, we expect no changes in purpose.

Considering the arguments given above, all in all we expect that working at the home-office is still positively rewarded, above work at the normal office, but that this effect has become smaller due to the pandemic and forced full-time work at the home-office. This effect is mediated by the (changed) meaning of the job. But still the empirical question remains: has the difference in well-being between home-office workers and other workers increased? Both groups have been affected by the pandemic, and have experienced changes in normal daily life that have a negative effect on well-being. Not being able to participate normally in society has a negative effect on subjective well-being. People have no or much fewer social and leisure activities and much less social contacts and had to deal with other constraints, all of which will have a negative impact on subjective well-being.

So, working full-time at the home-office, instead of partially, has effects on autonomy, competence, relatedness and work-life balance, all of which are known to affect subjective well-being. On basis of these considerations we formulate the hypothesis that mandatory full-time home-office work has a negative effect on subjective well-being and that the effect of working full-time at the home-office, due to the mandatory character, has become more negative in 2021 than in 2015 compared to working part-time at the home-office. This hypothesis is supported by several studies that have found that job satisfaction is highest among individuals who telecommute a moderate amount compared to those who telecommute either a small amount or more extensively (Golden, 2006b; Golden & Veiga, 2005; Virick et al., 2010) in (Allen et al. 2015)

Important conditions for the success of the home-office are the presence of the right equipment, learning to deal with the equipment and the behaviour of management. Managers need to change their own way of managing from behaviour-based control to output-based controls. We saw, however, that since the pandemic the sale of software that can be used to track the behaviour of home-office workers has increased. So not all managers change their behaviour to make the home-office a success. We have to consider when we start drawing conclusions

3   Data and method

To test our hypotheses we need to compare the effect of working at the home-office on subjective well-being before and during the pandemic. First of all we can expect that the covid-19 pandemic had an effect on the subjective well-being of everyone. So we need to measure the change in subjective well-being as well as well the in the incidence and intensity of working at the home-office. This is difficult to achieve because we do not have panel data. So we cannot model changes through time on a personal level. Then we need to test whether the changes in working at the home-office had an additional negative effect on the subjective well-being of workers. And this might differ between measures like job satisfaction and happiness or life satisfaction. Job satisfaction is affected by both the pandemic and the home-office where happiness or life-satisfaction are only affected by the pandemic, unless there are serious spill-overs from work to life (Angrist and Pischke 2009).

Our strategy is two-fold. First we estimate the effect of working at the home-office on subjective well-being in 2015, a few years before the pandemic. And we test whether this effect is mediated by autonomy, relatedness and work life balance. This should give us a general idea how voluntarily working at the home office affects the well-being of workers. Secondly, we estimate a similar model on data gathered in June and July in 2020. This gives us insight how mandatory working at the home-office affects the well-being of workers.

Of course we would like to analyse the changes between 2015 and 2020, but this is difficult if not impossible to do. The main reason is that we do not have the same information in both data sets. We have only one measure of well-being, i.e. the WHO-scale of vitality, in both data sets. Also some of the most important measures of autonomy, competence and relatedness differ between the data sets. So a straightforward comparison is impossible to do. Fortunately in the 2020 data set questions are asked about changes that have occurred due to the covid-19 pandemic, i.e. change in working place and change in working hours. So, we use these questions about the changes at the home-office, including changes in working hours to analyse effects of changes in the home-office.

3.1   Data

We use two large scale data sets to test our hypotheses. The first is the European Working Conditions Survey 2015 (EWCS) and the second is data from the second round of The Living, Working and COVID-19 survey held in June and July 2020. Both surveys are conducted by Eurofound, a research institute sponsored by the EU. Extensive information about these and other data sets can be found on: https://www.eurofound.europa.eu/. The EWCS was held in 35 European countries; the Living, Working and COVID-19 survey was held in the 27 EU-member countries and consists of several rounds. We use the second round held in June and July, which contained the most questions about job characteristics and working conditions.

We restrict our analyses to workers in paid employment aged between 20 and 65 years of age with residence in one of the EU27 countries. We further restrict our analyses to workers who have the opportunity to work at home as best as we could. This means that we exclude i.e. construction workers, truck drivers, traveling salesmen and other workers who do not work at the premises of their employers. We select only workers who either work at the premises of their employer, at home, or a combination of both. Both data sets contain questions to make this selection. We analyse cleaned data sets, implying that we removed all respondents who did not answer one or more of the questions, with the exception of our measure of income. The number of respondents is 20,144 for the EWCS and 10,266 for the LWC-19 survey.

3.1.1   EWCS

In the EWCS we use different measures of subjective well-being. First we use a question about satisfaction with the working conditions in the main job, a four point scale. Although it is a single item, it still is a good measure of job satisfaction (Wanous et al. 1997). Secondly we use a measure we named vitality, a scale constructed by the World Health Organisation. This scale consists of five items like: 'I have felt cheerful and in good spirits' and 'My daily life has been filled with things that interest me'. We combine them in one variable 'vitality' with a reliability of .874 and which is a six point scale. We also use four items of question 90 to construct a second measure of job vitality. Example items are: 'at my work I feel full of energy' and 'time flies when I am working'. This scale has a reliability of 0.71 and is a five point scale.

We measure working at the home-office with a single question about how often a person works in their own home. It is a five point scale which runs from never, less often, several times a month, several times a week to daily.

Work-life balance is measured by a five item scale (alpha = .76). Example items are "how often do you keep worrying about work when you are not working"; "how often have you found that your job prevented you from giving the time you wanted to your family". These items are part of question 85 in the questionnaire. The reliability is .76

Income is measured by a question about subjective household income which asks if it is easy or difficult to make ends meet. It is a six point scale. Effort is measured by the natural logarithm of the number of hours worked, by work pressure, the flexibility of the working hours and irregular working hours. Work pressure is a combination of two items about working at high speed and working to tight deadlines (alpha = .80). Flexible working hours is a construct of questions about working the same number of hours every day, same number of days every week, same number of hours every week, and having fixed starting and finishing times. It is a two point scale. Irregular working hours is a construct based on questions about how often do you work on Saturdays, Sundays or at night. The reliability is 0.65.

In the EWCS we have two measures for autonomy. The first one refers to the discretion in the work, and consists of items as: 'are you able to choose or change the order of tasks, methods of work and speed of work' and is a two point scale. The second measure we call empowerment and consists of five items like: 'you are consulted before objectives are set for your work', 'you have a say in the choice of your work colleagues' and is a five point scale with alpha 0.79.

Competence is measured with variables like task complexity, the use of skills and possibilities for development. Task complexity is measured by five items consisting of questions like does your job involve meeting high standards, assessing quality of own work, complex tasks, learning new things. The reliability is 0.64 and is a two point scale. The use of skills is measured by one item and is coded 1, present skills correspond well with my duties, 0 otherwise. Possibilities for development is measured by the question "my job offers good prospects for career advancement".

Relatedness is measured by two items about the support from colleagues and from the supervisor. It is a five point scale and the reliability is 0.67.

In the EWCS respondents are asked whether they have the feeling of doing useful work and whether the job gives a feeling of work well done. We combine these two questions into one variable 'purpose' following Nikolova and Cnossen who showed that these two variables together form one scale with high reliability (alpha = .724). It is a five point scale (1 low to 5 high) with a mean of 4.2.

We further use other job characteristics and demographic information. Other job characteristics on basis of the EWCS are: a supervisory position (yes, no); permanent contract (yes, no); dirty work (nine items, seven point scale, alpha 0.82).

Demographic variables are: gender (1 = woman, 0 = men); age (divided by ten) and its square; having a partner (yes, no); children present in the household (yes, no); level of education (ISCED, one digit) and subjective health (five point scale).

3.1.2   Living, Working and C1OVID-9

The only measure of subjective well-being that is included in both data sets is vitality. It consists of five questions developed by the WHO. The reliability in this data set is 0.89. Next to that we combine two questions about life satisfaction and happiness into one measure of subjective well-being (alpha = . 90). We use both measures as dependent variables.

Measures: We measured working at the home-office in three different ways. Firstly we used a question that asked for working at the home-office before covid-19, which is coded from 1 (never) to 5 (daily). Secondly we combined two questions about the workplace to create a variable consisting of three categories, 1 always work at the premises of the employer; 2 working both at the home-office and at the premises of the employer; 3, always working at the home-office. The question about the number of hours working at the home-office appeared to be too unreliable. We also constructed on basis of these two variables a new variable indicating which change in the workplace took place due to

covid-19. The variable is coded as: 1, always at the employer's premises; 2, a change to full-time home-office; 3, working fulltime at the home-office before and after; and 4 a change to part-time home-office.

We measured work-life balance by 5 standard items. Example items are 'Kept worrying about work when you were not working', 'Found that your job prevented you from giving the time you wanted to your family' and 'Found that your family responsibilities prevented you from giving the time you should to your job'. The reliability of the scale is 0.77.

We further tried to measure the other concepts in the model by Cassar and Meier. We used a question about subjective income as our measure of income, the natural logarithm of the working hours, including a dummy for those that did not answer the question or gave an unconceivable high number of working hours. In an additional analyses we used the change in working hours due to covid-19 coded on a five point scale from decreased a lot via no change to increased a lot. We furthermore measured effort by a question about exhaustion, 'You feel physically exhausted at the end of the working day', a five point scale. Next we included a measure of work pressure, 'You have enough time to get the job done'. Relatedness is measured by a question about isolation 'You feel isolated when working' and two items about support from colleagues and support from your manager. The reliability is 0.74. We measure purpose by a question about the feeling of doing useful work. All these questions have a five point scale, which were recode in reverse order to get scales running from low to high. Unfortunately, we don't have measures of autonomy and competence, although we know the level of education of the worker (three point scale).

We also include some biographical information as control variables. We use a combination of gender and partner (single men, single women, married women, married men), age (divide by ten) and the square of age, subjective health and finally a variable about online education of children that are present in the household. This variable includes information about households without children, children that do not receive online education and children receiving too little, too much or just enough online education.

3.2   Method

We use simple descriptive statistics, to start with. First of all an indication of the incidence and intensity of home-office work and the change between the years of study. Our model implies an indirect effect of working at the home-office via work-life balance on subjective well-being. This effect is further mediated by the determinants of work-life balance and subjective well-being: i.e. autonomy, relatedness, and flexible working hours. The other factors in our model, income, competence and purpose do not mediate the effect of working at the home-office, but must be used as control variables, like other job and personal characteristics. We also include country fixed effects to control for country differences. It would be possible to estimate a multi-level version of this model,

but that takes a huge amount of computing time. Because we only take variables at the individual level into account, controlling for country fixed effects suffices. We estimate models with the standard errors clustered at the country level. All in all this implies that we need to estimate a structural equation model to estimate all of the paths and to calculate the direct, indirect and total effects. We do so for both years. However, a direct comparison between the two years is complicated because the models do not contain the same variables, i.e. the variables are measured in different ways. Nevertheless we will try to do so. The model looks something like:
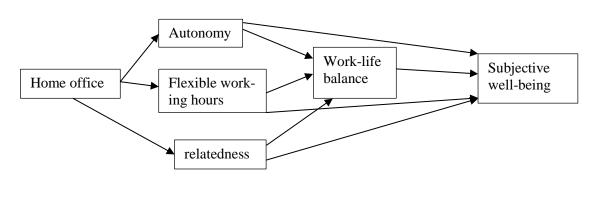

Figure 1: The structural model

We report the results of the structural equation models in different tables. The model consists of a system of recursive equations and are therefore simple to estimate. We could estimate them with different individual regression equations, but then the estimation of the indirect, direct and total effects becomes more complicated.

We estimate the following system:

$$\text{Autonomy}_i = \beta_{0c} + \beta_1 \, \text{HO}_i + \beta_2 \, \text{PC}_i + \beta_3 \, \text{C}_i + \varepsilon_i \tag{i}$$

$$\text{Flex Hours}_i = \beta_{0c} + \beta_1 \, \text{HO}_i + \beta_2 \, \text{PC}_i + \beta_3 \, \text{C}_i + \varepsilon_i \tag{ii}$$

$$\text{Support}_i = \beta_{0c} + \beta_1 \, \text{HO}_i + \beta_2 \, \text{PC}_i + \beta_3 \, \text{C}_i + \varepsilon_i \tag{iii}$$

$$\text{Work-life balance}_i = \beta_{0c} + \beta_1 \, \text{HO}_i + \beta_2 \, \text{Autonomy}_i + \beta_3 \, \text{FlexHours}_i + \beta_4 \, \text{Support}_i + \beta_5 \, \text{SDT}_i + \beta_6 \, \text{PC}_i + \beta_7 \, \text{C}_i + \varepsilon_i \tag{iv}$$

$$\text{Well-being}_i = \beta_{0c} + \beta_1 \, \text{HO}_i + \beta_2 \, \text{Autonomy}_i + \beta_3 \, \text{FlexHours}_i + \beta_4 \, \text{Support}_i + \beta_5 \, \text{WLB}_i + \beta_6 \, \text{SDT}_i + \beta_7 \, \text{PC}_i + \beta_8 \, \text{C}_i + \varepsilon_i \tag{v}$$

All models are estimated using the gsem command within STATA version 17. The indirect effects etc. are estimated with the nlcom (nonlinear combination) command. This estimates both the size of the effect as well as the standard errors and thereby the (in)significance of the effects.

4   Results

4.1   EWCS2015

Table 1 contains the results of the first part of the structural equation model: i.e. the effect of home-office on autonomy, flexible working hours and support in 2015. We see the expected effects. Working at home has a positive effect on the level of autonomy, although this does not increase with the intensity of working at home. We also find a positive effect of working at home on the amount of flexible working hours and this seems to increase with the intensity of working at home. And we see that working at home has a negative effect on the amount of felt support from colleagues and managers. This negative effect appears to be increasing with the intensity of working at the home-office.

Table 2 contains the results of the second part of the structural equation model. First of all we see a negative effect of working at home on work-life balance and this effect is increasing with the intensity of home-office work. This is somewhat unexpected, although some researchers report a blurring of boundaries between life and work due to the home office, it was expected that this effect was at least positive for the workers who work several times per month or per week at home. The full-time home-office might have more problems with the blurring of the boundaries, but that is not what we find in our 2015 data set. It could be a case of reverse causality, i.e. those workers who have the biggest problems with their work-life balance are allowed to work at home. This could be a point for further research, using a panel to disentangle these effects.

The effect of autonomy on work-life balance is not significant. We do find positive effects of support, competence, advance, purpose and income on work-life balance. We find negative effects of flexible working hours, which might increase the blurring of the boundaries, empowerment, complexity, which both ask for further involvement into the job and organisation, the number of working hours, work pressure and irregular working hours. Women and workers with partners also have a worse work-life balance.

The second pair of columns contain the effects of home-office on job satisfaction. We see a positive effect that increases with the amount of time spend at the home-office. This is against the expectation, which was that we would find a curve linear effect. The raw effect[3] of home office on job satisfaction seems to be curve linear, but the differences in effects between the amount of time spend in the home office are not significant. We see a rather strong positive effect of work-life balance on job satisfaction, next to positive effects of autonomy and support. The effect of flexible working hours is negative. We find further evidence for the model by Cassar and Meier, i.e. we find positive effects of empowerment, competence, possibilities for advancement and a strong effect of purpose. Next to that we find a positive effect of income and negative effects of different types of effort; hours worked,

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[3] The raw effect is the effect of home-office on job satisfaction without the other variables, but includes fixed country effects. You can request the author for further detailed results.

work pressure and irregular working hours. We find that women are more satisfied with their jobs than men. This also holds for the more healthy people.

On basis of these results we can calculate the indirect and total effect of working at the home office on job satisfaction. I.e. the indirect effect via work life balance of, say working several times per week at the home office is -.234 * 0.117 = -.027. But we also have an indirect effect via autonomy (0.111 * 0.045 = 0.005), via flexible working hours (0.194 * -0.054 = -0.011) and via support (-0.114 * 0.069 = -0.008). And we have further paths via the effects of autonomy, flexible working hours and support on work-life balance. This gives us a total indirect effect via autonomy of -.022, via flexible working hours of -0.043 and via support of -.036. The combined indirect effects of working several days at the home-office on job satisfaction is -.046, which makes the total effect (indirect effects plus direct effect) equal to 0.045, which is still significant.

We can do similar exercises for the effects of working daily at the home office, working several times a month at the home office, or even working less often at the home office. All have similar results. Some of the indirect effects are negative, some positive.

The combined indirect effects of less often are -0.022 and the total effect: 0.019 (not significant), of working several times a month at the home office -0.035 resp. 0.012 (n.s.) and working full time at the home office of -0.063 resp. 0.027 (n.s.).

These direct, indirect and total effects of working at the home office on job satisfaction show that working at the home-office is a two-sided sword. Some effects are positive, some are negative and the overall effects are rather small and mostly insignificant. The most severe negative effects of working at the home-office is the loss of support (socially and professionally isolation) and the negative effects on work-life balance. The positive effects are the increased autonomy and flexible working hours, although the latter have negative effects on work-life balance and job satisfaction.

We can do a similar exercise with vitality and job vitality as the ultimate dependent variables, but these show more or less similar results. Although the effect of working only a few hours at the home office has a negative on both types of vitality, we see that the effect is increasing with the number of hours spend at the home office, and the effects of work-life balance, autonomy, flexible working hours and support are more or less similar as on job satisfaction, so the same two edged sword appears.

On basis of these analyses on the 2015 data set we can conclude that working at the home office, in the end, has positive effects on well-being, as long as it is voluntary, although it comes with some costs.

4.2   Living, working and COVID-19

On basis of the survey held in June and July 2020 we wanted to estimate a similar model as on the 2015 data, so that we could compare results and see how the mandatory home-office work affected

subjective well-being. However it was not possible to do a direct comparison, because some important, measures like autonomy, were missing. So we had to cope with what was possible, doing the best we could. Although a direct comparison between the data sets is difficult, if not impossible, the 2020 data set has one big advantage and that is the measurement of the change in working at the home office. Questions are asked about working at home prior to the COVID-19 pandemic and working at home because of the pandemic. We used this information to estimate three different sets of structural equation models. In the first set of models we estimate the effects of working at home during the pandemic. In the second set we estimate the effects of the change to working at the home-office. And finally we estimate a model that contains the effects of working at the home office on well-being prior to the pandemic. The results of these analysis are presented in tables 3 through 8. In all these models we estimate the effects of working at home via support, isolation and changes in working hours on work-life balance and two measures of well-being of which the second one, the WHO measure of vitality is similar to what we have in the 2015 data set.

Table 3 reports the effect of working at home on support, isolation and changes in working hours. We see that working at home does not have an effect on the amount of support that workers get from their colleagues and bosses. However the home-office workers feel more isolated and they also experience an increase in the number of hours that they work. Singles feel more isolated than persons with a partner and women see a bigger increase in working hours than men. Middle aged workers feel least supported and see the largest increase in working hours. The higher educated feel more isolated, probably because we have not enough controls to explain this effect away, and see the largest increase in working hours. Healthy people get more support, but feel more isolated. The presence of children in the household do not show any effects on support, isolation and change in the number of hours work.

Table 4 report the effects on work-life balance, well-being and vitality. We see that working at the home office has a negative effect on work-life balance, just as was the case in 2015. The more time spend at the home office the worse the work-life balance is. Work-life balance has the expected positive effect on well-being and on vitality. This implies that the indirect of working at home via work-life balance on well-being and vitality is negative. These effects are: $-.0126 * 0.307 = -0.039$ on well-being and $-0.126 * 0.262 = -0.033$ on vitality. The indirect effect of working at home via support is almost zero and insignificant. The total indirect effect, thus home office via support via work-life balance is also nearly zero. The indirect effect of home office via isolation is -0.046 and the total indirect effect is -.054. The indirect via change in working hours is almost zero. The total indirect effect via change in working hours is nearly zero. The combined indirect effect is -.092. The total effect of home office on well-being is 0.098, the half of the direct effect (0.190). So, again we see a double edged sword, but now mainly via isolation and work-life balance.

Table 5 contains the effect of a change to part-time or full-time home office on support, isolation and a change in working hours. Again we see no effect of a (change to) home-office on support. So this remained the same for all workers. We see effects of a change to home-office on

isolation. The workers who worked at home before and during the pandemic show the largest effect, followed by those who changed to full-time home-office and those changing to part-time home office coming in third place. The change to the home-office had no effect on working hours, but those that worked before and during the pandemic at home saw an increase in their working hours.

Table 6 contains the effects of the change to home-office on work-life balance, well-being and vitality. The change to home-office has a negative effect on work-life balance, is larger for persons who changed to full-time home office than for persons who changed to part-time home-office. However persons already working at the home-office before the pandemic show the strongest negative effect. The effect on well-being is positive, especially for those who change to full-time home-office or already worked at the home-office before the pandemic. We see similar effects for vitality. Support has no effect on work-life balance, and positive effects on well-being and vitality. Isolation shows negative effects on work-life balance, well-being and vitality. The change in working hours shows a negative effect on work-life balance, this holds for persons who saw a decrease in their working hours as well as an increase in their working hours. The effect is positive for well-being and for vitality, i.e. persons who a decrease in working hours show a decrease in well-being and vitality, whereas persons who see an increase in working hours show an increase in well-being and vitality. Work life balance shows a positive effect on well-being and vitality. These effects are very similar to what we found in the analyses of working at the home-office during the pandemic (Table 4). Again we can calculate the indirect and total effects of all the paths. Here we present only the total indirect of a change to full-time home-office via support, isolation, a firm increase in working hours and work-life balance. This combined indirect effect is -0.085. The total effect of the change to full-time home-office is 0.88. So again we see a double edged sword, an indirect effect mainly via isolation and work-life balance, that is negative, a direct effect that is positive resulting in a total effect of about half of the estimated direct effect.

Tables 7 and 8 contain the analyses of the effect of home-office before the pandemic on work-life balance, well-being and vitality measured during the early stages of the pandemic. Again these results are quite similar to what we have seen in tables 3, 4, 5 and 6. So we are not going into further detail besides mentioning the combined indirect effect for those who worked daily at home via support, isolation, change in working hours and work-life balance on well-being. This effect is -0.076. The total effect of working daily at the home-office before the pandemic is 0.079, slightly more than half of the direct effect. Again, we see a double-edged sword.

5   Summary and conclusions

In this research we are interested into the effect of working at the home-office on well-being before and during the COVID-19 pandemic. To answer this question, we build a theoretical model that would explain this effect. The basis of this model is the model of Cassar and Meier that models the utility of

the non-monetary job characteristics next to the monetary ones. The basis of this model is the micro-economic labour supply model enhanced with the Self Determination Theory by Ryan and Deci and including a feeling of purpose of the job at hand. In a next step we modelled how working at the home-office would affect these non-monetary aspects of the job and in a further step how a mandatory home-office instead of a voluntary home-office would affect well-being. The final model is a model in which working at the home-office affects well-being via work-life balance and via aspects like autonomy, support and flexible hours. These last three factors also affect work-life balance. We tested this model with the help of two data sets. The first one is the European Working Conditions Survey held in 2015, that helps us model the effects of voluntary home-office prior the pandemic. The second one is the Living, Working and COVID-19 survey held in June and July 2020, which helps to model the effects of mandatory home-office during the pandemic. Both surveys are conducted by Eurofound.

On basis of the arguments and empirical results presented above we expect that home-office workers have a higher level of well-being than normal office workers, mainly due to increased autonomy and an increased work-life balance. However, this hypothesis depends on the number of hours worked at the home-office. We expect that the effect of number of hours worked at the home office is curve linear, implying that workers who work only a small number of hours or a large number of hours at the home-office have lower well-being than home-office workers who work only partially at the home office. Also longer working hours at the home-office can have negative effects on work-life balance.

The 2015 data set supported to a great deal our model on how the home-office affects well-being, the main exception being the effect on work-life balance. We see that the home-office increases autonomy on the job, increases flexibility of working hours, but decreases the amount of support workers get from colleagues and their managers. Furthermore, we found, surprisingly, a negative effect of working at the home-office on work-life balance. Flexible working hours had a negative effect on work-life balance too. Next to that we found positive effects of working at the home-office, work-life balance, support and autonomy on well-being. The effect of flexible working hours has a negative effect on well-being. All in all this causes the home-office to act like a double edged sword. It has a strong negative mediating effect, mainly via work-life balance, on well-being, but in the end the total effect is positive. The raw effect of working at home is almost double the size of the remaining direct effect.

So working at home comes with it advantages and disadvantages. The advantage is the increased autonomy and increased well-being. The disadvantages are the loss of support and the decreased work-life balance, which in the end reduces well-being. The negative effect of working at home on work-life balance came as a bit of surprise. Many researchers report a positive effect of working at home on work-life balance, although the borderlines between home and work can be blurred, especially when one workers long hours at the home-office, i.e. daily. Working only part-time at the home-office should increase work-life balance. We do not find such effects, although working

daily at home has a stronger negative effect on work-life balance than when a worker does it less often. So there is an increasing blurring effect of working at home.

One reason why we do find a negative of working at home on work-life balance could be reverse causation. I.e. workers with a bad work-life balance, due to whatever reason, are allowed to work at home to tackle this problem. With this cross-sectional data set these two effects are difficult to disentangle. To do that we would need to include an additional equation in our model, that would measure the effect of work-life balance on the amount of work at the home-office, making the model non-recursive. But that would complicate the model considerably, also making identification more difficult. A panel design would be much better to identify the direction of causation.

Many researchers report a curve-linear effect of working at home on well-being, i.e. an increasing effect up to about working two days at home on well-being, decreasing thereafter. Again we do not find such an effect. The estimated raw effect of working at home well-being suggests that such an effect is real, but the differences in the estimated parameters are not significant. This suggests that the effect of working at home on well-being does not depend on the hours spend at the home-office but only on the possibility to do so, independent of the hours of work. Actually in all our models (different dependent variables), we see an increasing effect of time spend at the home-office. Given the double-edged sword of working at the home-office we do not have a good explanation for this effect. Again, we have to realise that the models are estimated on cross-sectional data, which comes with the known limits.

However, all in all we can say that our ideas on how working at the home-office affects well-being are supported. The non-monetary rewards, or working conditions, do have important significant effects which have to be reckoned when employers allow or even stimulate working at home.

Based on these results, looking through the lenses of the workers, we can see why workers want more possibilities to work at home. In the same time employers might be more reluctant, given the reduction of support among and between workers, and given the worse work-life balance that might affect burn-out of the workers (Wielers et al. 2022). The reduction in support might reduce the knowledge transfers within the organisation with possible long term negative effects for the productivity and the whole organisation.

We also formulated additional hypotheses about the change to a mandatory home office. We hypothesized that mandatory full-time home-office work has a negative effect on subjective well-being and that the effect of working full-time at the home-office, due to the mandatory character, has become more negative in 2021 than in 2015 compared to working part-time at the home-office.

Our analyses of the Living, Working and COVID-19 survey show similar results as the analyses of the EWCS 2015 data set, although we had to work with different measures and variables. Working at the home-office increases the sense of isolation and again we find a negative effect of working at home on work-life balance. We also found that workers who had to change to working full-time or part-time at the home office report a lower level of work-life balance. The work-life balance of

workers who worked pre-pandemic and during the pandemic showed to be the worse. This implies that working full-time at the home-office has severe negative effects on work-life balance. However, if we look at the effects of working at the home-office prior to the pandemic on work-life balance we see that work-life balance is worse for workers who only work at the home-office every now and then. This would suggest a reverse causation, i.e. workers who have a bad work-life balance, for whatever reason, start working at home. This would be a topic for future research. To do that we need a panel design and more information on the household situation. Is someone living alone, or together with someone else? Does the partner have a job? Is that a full-time job? Where is this job performed, at home or somewhere else? We do control for gender, partner and children effects, but not in a fully controlled way. We find some partner effects, i.e. on work-life balance, but also gender effects, i.e. on the change in working hours.

We do find support for the hypothesis that the mandatory character of working at the home-office negatively affects well-being. The workers who had to change to the home-office show smaller positive effects on well-being (and vitality) than workers who prior to the pandemic already worked at the home office. However, due to the design of the study we are a bit cautious to draw too firm conclusions based on these results. Also because we cannot directly compare these results with our results based on the EWCS2015.

All in all we find positive effects of working at the home-office on the well-being of workers, both pre- and during the pandemic. So we understand why workers now demand more possibilities for working at the home-office especially if they have to work at bad offices at their employers premises, like shared office spaces. Despite these demands we think that employers should be careful to allow workers to work full-time at home, due to some important negative effects of which we do not yet fully know how this works out in the long term.

First of all, working at home comes with a feeling of isolation, both socially and professionally, which has negative effects on work-life balance and well-being. These effects could become stronger the longer the period is the workers spend (full-time) at the home-office. It makes communication with colleagues more difficult, do not underestimate the importance of gossip, thereby also the transfer of knowledge between colleagues and team members. This might be especially harmful for workers who have just entered the labour market, i.e. just have left the educational system, because they will not receive a proper introduction to the organisation with all its habits and peculiarities. It also might be harmful for older workers who just joined the organisation or department due to a change of jobs. And of course it also depends on the amount of interdependency between workers. Highly interdependent workers need much more (face-to-face) interactions than workers who are much less dependent on the work done by their colleagues.

Secondly, we see that home-office workers work longer hours. These longer hours have a severe negative effect on work-life balance. After a longer period of time this can increase the feeling of work pressure, thereby also increasing the risk of a burn-out. In todays society, burn-out has

become an increasing problem. Workers drop out of work for a longer period of time once they feel burned-out. Given the worse work-life balance of the home-office workers this can become an even more serious problem for employers.

Employers should also know that the way in which their home-office workers should be supervised needs to be changed. One of the main advantages of working at home is the increased autonomy. So employers should give their home-office workers enough autonomy. So, they need to steer on output of the home-office workers, not on input. The increased use of devices to track the behaviour of the home-office worker will have counter productive effects. Remarks like the one of Elon Musk, "of course my workers are allowed to work at home, as long as they show up forty hours per week at the office", do not help.

We did not explore the effects of working conditions at the home-office. I.e. get workers support from their employers to set-up a decent home-office. Do they receive equipment (a PC or laptop) and facilities (a broadband internet connection), a decent desk, chair and mobile phone etc. These are pre-requisites for workers at home. Just as employers are responsible for working conditions at the office, they are also responsible for the working conditions at the home office.

We also did not fully explore the effects of the household situation. We see that singles are more isolated than workers who live together with other people. We hardly found effects of the presence of children who received online education, although this probably will not happen again in the future on a large scale.

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Table 1. Effect of home office on discretion, flexible hours and support

	discretion		Flexible hours		support	
	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
Constant	1.148*	(0.050)	1.614*	(0.040)	2.921*	(0.150)
Ho less often	0.111*	(0.009)	0.072*	(0.013)	-0.015	(0.028)
HO several month	0.110*	(0.011)	0.139*	(0.012)	-0.060*	(0.030)
HO several week	0.111*	(0.012)	0.194*	(0.015)	-0.114*	(0.041)
HO daily	0.130*	(0.013)	0.175*	(0.021)	-0.297*	(0.078)
Female	0.001	(0.008)	-0.034*	(0.006)	-0.011	(0.023)
Partner	0.014	(0.009)	-0.012*	(0.005)	0.034*	(0.016)
Child < 12 home	0.003	(0.008)	-0.015*	(0.005)	0.009	(0.021)
Age	0.060*	(0.022)	-0.069*	(0.016)	-0.077	(0.052)
Age # age	-0.004	(0.003)	0.005*	(0.002)	0.007	(0.006)
Education	0.036*	(0.003)	0.010*	(0.003)	0.040*	(0.008)
Subj. health	0.028*	(0.005)	-0.023*	(0.004)	0.172*	(0.019)
var(e.dependent)	0.131	(0.006)	0.103	(0.002)	0.935	(0.038)
N	20,144		20,144		20,144	

Source: EWCS 2015, our calculations

Table 2. Effect of home-office on work-life balance and well-being

	work life balance		job satisfaction		vitality		job vitality	
	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
Constant	5.093*	(0.099)	1.142*	(0.121)	0.319	(0.175)	1.291*	(0.111)
Ho less often	-0.171*	(0.016)	0.041*	(0.018)	-0.059*	(0.019)	-0.031*	(0.013)
HO several month	-0.209*	(0.018)	0.047*	(0.019)	-0.073*	(0.029)	-0.022	(0.017)
HO several week	-0.234*	(0.027)	0.091*	(0.016)	-0.024	(0.037)	0.021	(0.021)
HO daily	-0.278*	(0.023)	0.090*	(0.032)	0.056	(0.049)	0.070*	(0.023)
Female	-0.153*	(0.011)	0.048*	(0.011)	-0.060*	(0.014)	0.065*	(0.006)
Partner	-0.066*	(0.011)	0.013	(0.010)	0.008	(0.014)	0.003	(0.009)
Child < 12 home	-0.157*	(0.010)	0.021	(0.011)	0.046*	(0.013)	0.036*	(0.008)
Age	-0.207*	(0.041)	-0.014	(0.036)	0.032	(0.044)	0.056*	(0.024)
Age # age	0.026*	(0.005)	0.003	(0.004)	-0.002	(0.005)	-0.002	(0.003)
Education	-0.033*	(0.004)	-0.010*	(0.003)	-0.018*	(0.005)	-0.004	(0.003)
Subj. health	0.159*	(0.008)	0.120*	(0.011)	0.357*	(0.012)	0.101*	(0.008)
Discretion	0.020	(0.016)	0.045*	(0.014)	-0.008	(0.026)	0.023	(0.014)
Flexible hours	-0.207*	(0.018)	-0.054*	(0.020)	-0.137*	(0.022)	-0.010	(0.023)
Support	0.055*	(0.009)	0.069*	(0.009)	0.063*	(0.009)	0.031*	(0.007)
Empower	-0.036*	(0.007)	0.094*	(0.008)	0.091*	(0.010)	0.055*	(0.008)
Complexity	-0.276*	(0.032)	-0.117*	(0.023)	0.008	(0.036)	0.064*	(0.021)
Competence	0.034*	(0.011)	0.040*	(0.010)	-0.020	(0.014)	-0.033*	(0.009)
Advance	0.016*	(0.004)	0.098*	(0.006)	0.070*	(0.007)	0.061*	(0.004)
Purpose	0.133*	(0.008)	0.129*	(0.012)	0.218*	(0.016)	0.300*	(0.009)
Subj. inc	0.051*	(0.006)	0.054*	(0.005)	0.051*	(0.008)	0.016*	(0.004)
Hours worked(ln)	-0.226*	(0.016)	-0.027	(0.019)	-0.028	(0.017)	-0.049*	(0.010)
Work pressure	-0.084*	(0.004)	-0.026*	(0.003)	-0.009*	(0.004)	0.007*	(0.002)
Irregular hrs	-0.075*	(0.005)	-0.016*	(0.006)	0.025*	(0.007)	0.024*	(0.008)
Work-life balance			0.117*	(0.009)	0.310*	(0.018)	0.092*	(0.009)
var(e.dependent)	0.359	(0.013)	0.309	(0.009)	0.640	(0.029)	0.227	(0.010)
N	20,144		20,144		20,144		20,144	

Source: EWCS 2015, our calculations

Table 3. Effect of home office on support, isolation and change in working hours

	Support		Isolation		Change in working hours	
	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. Error
Constant	3.685*	(0.214)	2.656*	(0.229)	1.909*	(0.233)
Both home, employer	0.011	(0.028)	0.124*	(0.036)	0.011	(0.029)
Home-office	-0.034	(0.020)	0.301*	(0.038)	0.116*	(0.035)
Single man	0.006	(0.043)	0.131*	(0.059)	-0.075	(0.048)
Single women	-0.025	(0.030)	0.115*	(0.038)	0.078*	(0.032)
Married woman	0.035	(0.029)	-0.017	(0.022)	0.069*	(0.023)
Age	-0.362*	(0.102)	-0.034	(0.080)	0.198*	(0.091)
Age # age	0.038*	(0.011)	-0.006	(0.009)	-0.022*	(0.011)
Education	0.008	(0.029)	0.081*	(0.024)	0.288*	(0.033)
Subjt. health	0.191*	(0.014)	-0.233*	(0.019)	-0.019	(0.014)
No children	-0.038	(0.064)	0.023	(0.051)	-0.028	(0.041)
Children, no online education	Refererence category					
Children, too little	-0.107	(0.075)	0.098	(0.058)	0.107	(0.061)
Children, about the right amount	0.030	(0.057)	-0.040	(0.058)	-0.031	(0.050)
Children, too much	-0.081	(0.095)	0.157	(0.082)	0.196	(0.106)
var(e.dependent)	0.882	(0.018)	1.036	(0.023)	1.280	(0.045)
N	10,266		10,266		10,266	

Source: Living, working and Covid-19 survey

Table 4. Effect of home office on work-life balance and well-being

	Work-life balance		Wellbeing		Vitality	
	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
Constant	4.950*	(0.147)	2.696*	(0.444)	0.218	(0.325)
Both home, employer	-0.079*	(0.016)	0.064	(0.037)	0.035	(0.024)
Home-office	-0.126*	(0.012)	0.190*	(0.036)	0.084*	(0.024)
Single man	0.075*	(0.024)	-0.419*	(0.051)	-0.122*	(0.025)
Single woman	0.082*	(0.017)	-0.330*	(0.044)	-0.141*	(0.019)
Married woman	-0.064*	(0.018)	0.012	(0.044)	-0.089*	(0.021)
Age	-0.182*	(0.047)	0.039	(0.113)	0.197*	(0.058)
Age # age	0.025*	(0.005)	-0.004	(0.013)	-0.016*	(0.007)
Education	-0.051*	(0.013)	0.052	(0.039)	0.030	(0.024)
Subjt. health	0.038*	(0.010)	0.376*	(0.024)	0.347*	(0.013)
No children	0.301*	(0.037)	-0.162*	(0.063)	-0.016	(0.035)
Children, no online education			Reference catagory			
Children, too little	0.077*	(0.034)	-0.117	(0.070)	-0.011	(0.040)
Children, about the right amount	0.147*	(0.033)	0.055	(0.074)	0.099*	(0.040)
Children, too much	0.097	(0.050)	-0.148	(0.087)	0.096	(0.054)
Support	-0.011	(0.007)	0.090*	(0.033)	0.049*	(0.019)
Isolation	-0.084*	(0.008)	-0.154*	(0.040)	-0.087*	(0.021)
Hours decreased a lot	-0.045*	(0.022)	-0.159*	(0.052)	-0.055*	(0.023)
Hours decreased a little	-0.094*	(0.017)	-0.054	(0.046)	-0.025	(0.025)
Hours increased a little	-0.112*	(0.013)	0.092*	(0.042)	0.068*	(0.021)
Hours increased a lot	-0.242*	(0.020)	0.107*	(0.051)	0.073*	(0.028)
Job securerity	0.060*	(0.007)	0.152*	(0.022)	0.041*	(0.010)
Usefulness of job	0.030*	(0.006)	0.170*	(0.023)	0.151*	(0.011)
Exhaustion	-0.317*	(0.012)	-0.169*	(0.027)	-0.190*	(0.024)
Work pressure	-0.122*	(0.007)	0.004	(0.019)	-0.006	(0.012)
Subjet income	0.046*	(0.005)	0.273*	(0.027)	0.074*	(0.008)
Hous of work (ln)	-0.052*	(0.016)	-0.018	(0.023)	0.019	(0.016)
Hours of work missing	-0.205*	(0.062)	-0.183	(0.098)	0.032	(0.068)
Work- life balance			0.307*	(0.048)	0.262*	(0.055)
var(e.dependent)	0.274	(0.006)	1.968	(0.152)	0.592	(0.019)
N	10,266		10,266		10,266	

Source: Living, working and COVID-19

Table 5 Effect of change to home office on support, isolation and change in working hours

	support		isolation		Change in working hours	
	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
Constant	3.684*	(0.214)	2.660*	(0.232)	1.918*	(0.231)
Change to Full-time HOI	-0.025	(0.022)	0.272*	(0.043)	0.073	(0.040)
Home-office	-0.039	(0.033)	0.321*	(0.040)	0.207*	(0.037)
Change to part-time HO	0.008	(0.027)	0.121*	(0.037)	-0.017	(0.028)
Single man	0.006	(0.044)	0.128*	(0.059)	-0.078	(0.048)
Single woman	-0.025	(0.030)	0.116*	(0.038)	0.079*	(0.032)
Married woman	0.035	(0.029)	-0.016	(0.022)	0.069*	(0.023)
Age	-0.361*	(0.102)	-0.036	(0.081)	0.198*	(0.091)
Age # age	0.038*	(0.011)	-0.006	(0.009)	-0.023*	(0.011)
Education	0.007	(0.029)	0.083*	(0.024)	0.289*	(0.032)
Subjt. health	0.191*	(0.014)	-0.233*	(0.019)	-0.019	(0.014)
No children	-0.038	(0.064)	0.024	(0.052)	-0.026	(0.041)
Children, no online education						
Children, too little	-0.106	(0.074)	0.097	(0.058)	0.107	(0.062)
Children, about the right amount	0.030	(0.057)	-0.042	(0.057)	-0.033	(0.051)
Children, too much	-0.080	(0.094)	0.151	(0.081)	0.190	(0.104)
var(e.support)	0.883	(0.018)	1.037	(0.023)	1.278	(0.044)
N	10,266		10,266		10,266	

Source: Living, working and Covid-19 survey

Table 6. Effect of change to home office on work-life balance and well-being

	work life balance		wellbeing		vitality	
	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
Constant	4.944*	(0.149)	2.695*	(0.446)	0.223	(0.323)
Change to Full-time HOI	-0.115*	(0.012)	0.173*	(0.039)	0.066*	(0.023)
Home-office	-0.147*	(0.022)	0.232*	(0.041)	0.112*	(0.033)
Change to part-time HO	-0.068*	(0.016)	0.022	(0.041)	0.031	(0.026)
Single man	0.076*	(0.024)	-0.421*	(0.051)	-0.123*	(0.025)
Single woman	0.081*	(0.017)	-0.330*	(0.043)	-0.141*	(0.019)
Married woman	-0.065*	(0.018)	0.012	(0.044)	-0.088*	(0.021)
Age	-0.183*	(0.047)	0.042	(0.113)	0.197*	(0.058)
Age # age	0.025*	(0.005)	-0.005	(0.014)	-0.016*	(0.007)
Education	-0.052*	(0.013)	0.053	(0.039)	0.031	(0.024)
Subjt. health	0.038*	(0.010)	0.376*	(0.024)	0.347*	(0.013)
No children	0.301*	(0.037)	-0.162*	(0.063)	-0.015	(0.035)
Children, no online education						
Children, too little	0.077*	(0.034)	-0.118	(0.070)	-0.011	(0.040)
Children, about the right amount	0.148*	(0.033)	0.053	(0.074)	0.098*	(0.040)
Children, too much	0.099*	(0.050)	-0.154	(0.087)	0.094	(0.053)
Support	-0.011	(0.007)	0.090*	(0.034)	0.049*	(0.019)
Isolation	-0.083*	(0.008)	-0.155*	(0.040)	-0.087*	(0.021)
Hours decreased a lot	-0.045*	(0.022)	-0.160*	(0.053)	-0.055*	(0.023)
Hours decreased a little	-0.093*	(0.016)	-0.055	(0.047)	-0.026	(0.026)
Hours increased a little	-0.111*	(0.013)	0.090*	(0.042)	0.067*	(0.021)
Hours increased a lot	-0.240*	(0.020)	0.101*	(0.051)	0.071*	(0.028)
Job securerity	0.060*	(0.007)	0.153*	(0.021)	0.042*	(0.010)
Usefulness of job	0.030*	(0.006)	0.168*	(0.023)	0.150*	(0.011)
Exhaustion	-0.317*	(0.012)	-0.169*	(0.027)	-0.190*	(0.024)
Work pressure	-0.122*	(0.007)	0.005	(0.019)	-0.006	(0.012)
Subjet income	0.046*	(0.005)	0.272*	(0.027)	0.074*	(0.008)
Hous of work (ln)	-0.052*	(0.016)	-0.018	(0.023)	0.019	(0.016)
Hours of work missing	-0.203*	(0.063)	-0.186	(0.097)	0.029	(0.068)
Work- life balance			0.309*	(0.047)	0.262*	(0.056)
var(e.support)	0.274	(0.006)	1.967	(0.153)	0.591	(0.019)

Source: Living, working and Covid-19 survey

Table 7. Effect of home office before covid on support, isolation and change in working hours

	support		isolation		Change in working hours	
	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
Constant	3.691*	(0.212)	2.669*	(0.244)	1.969*	(0.231)
HO less often	0.014	(0.038)	0.137*	(0.033)	0.167*	(0.043)
HO several per month	0.023	(0.039)	0.138*	(0.037)	0.192*	(0.051)
HO several per week	-0.030	(0.057)	0.145*	(0.049)	0.162*	(0.044)
HO daily	-0.016	(0.030)	0.283*	(0.032)	0.298*	(0.044)
Single man	0.009	(0.042)	0.128*	(0.058)	-0.067	(0.048)
Single woman	-0.025	(0.030)	0.127*	(0.037)	0.093*	(0.031)
Married woman	0.034	(0.030)	0.000	(0.022)	0.082*	(0.022)
Age	-0.361*	(0.102)	-0.058	(0.084)	0.175*	(0.089)
Age # age	0.038*	(0.011)	-0.004	(0.009)	-0.020	(0.011)
Education	-0.001	(0.027)	0.126*	(0.027)	0.271*	(0.033)
Subjt. health	0.190*	(0.014)	-0.230*	(0.020)	-0.020	(0.014)
No children	-0.038	(0.065)	0.029	(0.053)	-0.022	(0.041)
Children, no online education						
Children, too little	-0.106	(0.075)	0.101	(0.058)	0.107	(0.062)
Children, about the right amount	0.030	(0.057)	-0.038	(0.058)	-0.028	(0.049)
Children, too much	-0.079	(0.094)	0.146	(0.083)	0.195	(0.106)
var(e.dependent)	0.883	(0.018)	1.044	(0.021)	1.273	(0.044)

Source: Living, working and Covid-19 survey

Table 8. Effect of home office before on work-life balance and well-being

	work life balance		wellbeing		vitality	
	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
Constant	4.895*	(0.150)	2.757*	(0.442)	0.248	(0.315)
HO less often	-0.103*	(0.016)	0.129*	(0.045)	0.095*	(0.023)
HO several per month	-0.152*	(0.020)	0.013	(0.048)	0.030	(0.030)
HO several per week	-0.126*	(0.029)	0.195*	(0.044)	0.098*	(0.041)
HO daily	-0.118*	(0.021)	0.154*	(0.058)	0.101*	(0.039)
Single man	0.071*	(0.024)	-0.418*	(0.052)	-0.119*	(0.025)
Single woman	0.070*	(0.017)	-0.319*	(0.045)	-0.135*	(0.019)
Married woman	-0.076*	(0.019)	0.025	(0.044)	-0.082*	(0.021)
Age	-0.169*	(0.048)	0.031	(0.112)	0.192*	(0.058)
Age # age	0.024*	(0.006)	-0.004	(0.013)	-0.015*	(0.007)
Education	-0.060*	(0.013)	0.073	(0.041)	0.034	(0.023)
Subjt. health	0.039*	(0.010)	0.377*	(0.025)	0.347*	(0.013)
No children	0.299*	(0.037)	-0.162*	(0.064)	-0.016	(0.034)
Children, no online education	0.077*	(0.034)	-0.120	(0.071)	-0.013	(0.040)
Children, too little	0.145*	(0.033)	0.052	(0.074)	0.097*	(0.039)
Children, about the right amount	0.101*	(0.050)	-0.157	(0.087)	0.093	(0.053)
Children, too much	-0.010	(0.007)	0.091*	(0.033)	0.049*	(0.019)
Isolation	-0.086*	(0.008)	-0.148*	(0.039)	-0.086*	(0.020)
Hours decreased a lot	-0.049*	(0.022)	-0.151*	(0.052)	-0.052*	(0.023)
Hours decreased a little	-0.089*	(0.016)	-0.061	(0.047)	-0.030	(0.026)
Hours increased a little	-0.110*	(0.013)	0.096*	(0.043)	0.067*	(0.021)
Hours increased a lot	-0.239*	(0.020)	0.110*	(0.051)	0.070*	(0.028)
Job securerity	0.060*	(0.007)	0.153*	(0.021)	0.042*	(0.010)
Usefulness of job	0.033*	(0.006)	0.163*	(0.023)	0.149*	(0.011)
Exhaustion	-0.314*	(0.012)	-0.179*	(0.026)	-0.193*	(0.024)
Work pressure	-0.121*	(0.007)	0.003	(0.019)	-0.007	(0.012)
Subjet income	0.045*	(0.005)	0.277*	(0.027)	0.075*	(0.007)
Hous of work (ln)	-0.049*	(0.016)	-0.022	(0.023)	0.017	(0.016)
Hours of work missing	-0.197*	(0.064)	-0.198*	(0.097)	0.024	(0.068)
Work- life balance			0.304*	(0.047)	0.263*	(0.054)
var(e.dependent)	0.273	(0.006)	1.969	(0.150)	0.591	(0.019)
N	10,266		10,266		10,266	

Source: Living, working and Covid-19 survey

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