Working from home, job satisfaction and work–life balance – robust or heterogeneous links?

Lutz Bellmann

Institute for Employment Research, University of Erlangen-Nuremberg, Nürnberg, Germany, and

Olaf Hübler

Institute for Empirical Economics, Leibniz University Hannover, Hannover, Germany

Abstract

Purpose – It is analyzed whether working from home improves or impairs the job satisfaction and the work–life balance and under which conditions.

Design/methodology/approach – Blocks of influences on job satisfaction and work–life balance – personal traits, job characteristics, skills and employment properties – are estimated separately and in combination. To select the variables, the least angle regression is applied. The entropy balancing approach is used to determine causal effects. The study investigates whether imbalances are determined by private or job influences, whether firm-specific regulations and the selected control group affect the results and whether it only takes place during leisure time.

Findings – No clear effects of remote work on job satisfaction are revealed, but the impact on work–life balance is generally negative. If the imbalance is conditioned by private interests, this is not corroborated in contrast to job conditioned features. Employees working from home are happier than those who want to work at home, job satisfaction is higher and work–life balance is not worse under a strict contractual agreement than under a nonbinding commitment.

Originality/value – A wide range of personality traits, skills, employment properties and job characteristics are incorporated as determinants. The problem of causality is investigated. It is analyzed whether the use of alternative control and treatment groups leads to different results. The empirical investigation is based on new German data with three waves.

Keywords Telecommuting, Remote work, Effects on employees, Job satisfaction, Work–life balance

Paper type Research paper

1. Introduction

Working from home, also called remote work (RW), telecommuting, teleworking, homework, home office, mobile work, outwork and the flexible workplace, is a work arrangement, in which employees do not commute to their workplace in the company. Despite advances in technology during the last decade, working from home has grown only modestly. Interestingly only 12% of all employees in Germany work primarily or occasionally from home, although this practice would theoretically be possible for 30–40% of the jobs (Brenke, 2016). The Bureau of Labor Statistics (2019) reported that in 2018 almost 25% of wage and salary workers at least occasionally worked from a home office.

The increasing acceptance of working from home may be led by management, because reduced labor costs and increasing productivity and profitability are expected. This development

also relates to concerns over deteriorating work–life balance (WLB) and the potential of RW to help address this, but thus there is a lack of systematic evidence or consensus. Even within a single industry, practices vary considerably. Many employers still insist on compulsory presence at the workplace. Unions were reluctant to support RW in the past. For their part fearing that establishments would use an extension of RW to save costs and that the employees would have to work under precarious conditions. This attitude has partially changed. For example, on Labor Day 2018, the German Confederation of Trade Unions (DGB) insisted on a legal claim on working from home in case it is not an impediment to the operation of the business. Since 2016, employers in the Netherlands have been obligated to check whether it is possible to allow RW if an employee expresses a preference for such work.

Using a large matched employer–employee panel data set for Germany 2012–2016, this paper reveals a heterogeneous influence of home office use on job satisfaction (JS) and WLB. Thus, we conclude that only if certain conditions are fulfilled, working from home is to be advocated. The findings of studies based on restrictive samples and variables may be misleading for both firms and employees, who wish to use home office, but are not always well advised to do so.

In this paper, we focus on the effect of RW on JS and WLB. These two aspects are most important for determining the conditions under which employees want to work from home. Although employees who use a home office report its advantages, it remains questionable whether this result can be generalized with respect to all employees. An extension of home office use may not be advantageous for some employees. A better WLB is mentioned quite often as the most important advantage of home offices (Crosbie and Moore, 2004; Gajendran and Harrison, 2007). However, it is not clear whether working from home improves the WLB. For example, some people will use hours intended as leisure for a prolongation of working time at home because otherwise they might feel overburdened to complete work tasks at the formal workplace (Dex and Bond, 2005). Therefore, we are going to focus our analyses on this variable. Furthermore, we also more comprehensively consider RW's impact on JS. We go beyond the existing literature in a number of ways: first, we investigate the importance of personality traits, especially measured by Big5 variables and job characteristics (JC), among other determinants. We incorporate those that are mentioned in the home office literature as influential, for example, autonomy, stress, coworkers' commitment and collegiality, for the relationship between RW and JS, whether the influence of working from home on WLB is robust. Second, the relevant control variables are selected by means of the least angle regression (LARS) procedure (Efron *et al.*, 2004). Third, the problem of causality is investigated using an entropy balance procedure (Heinmueller, 2012). Fourth, we analyze whether the use of alternative control and treatment groups leads to different results. Fifth, the empirical study is based on a new German data set with three waves.

Our results are important because they show under what conditions RW increases JS, that WLB is not improved by RW and that home offices are not a good alternative to working in the office or do not lead to improvements in welfare for wide ranges of workers.

The remainder of the paper is structured as follows. Section 2 summarizes related literature on RW and formulates hypotheses. Section 3 outlines the data and some descriptive results. In Section 4, our empirical strategy is sketched. Section 5 reports the econometric results, and section 6 briefly concludes.

2. Related literature and hypotheses

Two topics from the RW literature are of special relevance for our study. That is to say, some analyses emphasize the positive RW's effects on JS (Gajendran and Harrison, 2007; Gimenez-Nadal *et al.*, 2018; Hill *et al.*, 2003; Paulin *et al.*, 2017; Standen and Omari, 1997; Suh and Lee, 2017; Wheatley, 2012, 2017). Others see the work–family interface as a more convincing research subject (Crosbie and Moore, 2004; Dex and Bond, 2005;

Dockery and Bawa, 2018; Golden *et al.*, 2006; Golden, 2012; Hill *et al.*, 2003; Moore, 2006; Russell *et al.*, 2007). Some papers evaluate RW as a good idea that leads to greater integration between the work and family roles, as well as more JS (Sullivan and Lewis, 2001; Dubrin, 1991). However, Jostell and Hemlin (2018) show that telecommuting reduces JS and if work interruptions during leisure are not avoided, it intensifies the work–family conflict by increasing the permeability of work and family boundaries. Song and Gao (2018) find that working at home is associated with a higher probability of having unpleasant feelings relative to working in the workplace. Bringing work home on weekdays results in less happiness. Noonan and Glass (2012) argue that working from home is not helpful in reducing work–family conflicts. Research of Suh and Lee (2017) suggests that the manner in which technology and JC influence technostress depends on the intensity of telework. Certainly, JS and WLB are worthwhile outcome variables that can reveal whether RW should be preferred by employees.

In the literature we also find discussions of telecommuting's potential for relational impoverishment at work (Gajendran and Harrison, 2007). The reduction in face-to-face interactions and the lower frequency and richness of communication between telecommuters and other members of the organization have weakened the interpersonal bonds they have with their coworkers or supervisors (Daft and Lengel, 1986). These are obvious disadvantages of RW for the employees. We consider these ideas by the inclusion of JC in our estimates.

Further empirical studies investigate autonomy, which is a key feature of any work arrangement (Gajendran and Harrison, 2007). And again others concentrate on the effects of RW on job changes and role stress (Gajendran and Harrison, 2007), commitment (Standen and Omari, 1997), the decision of women to participate in the labor market (Edwards and Field-Hendrey, 2002), work volume (Giminez-Nadal *et al.*, 2018; Wheatley, 2012). We test whether autonomy, stress, commitment and gender should be incorporated as control variables.

Taken together, these themes hint at a "remote work paradox" of mutually incompatible consequences for employees. If telecommuting is used in order to enhance perceived autonomy and lower work–family conflict, this would mean, in turn, an enhancement of job-related attitudes, improved performance and reduced stress. However, if telecommuting also damages vital work relationships and hampers career advancement, this implies that outcomes in the work and nonwork domains come at the expense of outcomes in the relationship or social domains (Gajendran and Harrison, 2007).

We restrict our investigations to RW's effects on JS and WLB. Empirical studies of these two topics usually do not take into account the specific conditions of RW that lead to different outcomes and ignore causality problems. They neglect personality traits and JC. This may have the consequence that a seemingly influence of RW on JS and WLB is revealed although this is attributable to one of the mentioned variables. We demonstrate this with two examples. First, we assume that people who are emotionally unstable tend to have less satisfaction than others, on the one hand, and do not prefer work from home because they need help at their work from colleagues, on the other hand. Then a positively statistical influence of RW on JS is revealed even if no causal link exists between RW and JS. Second, we assume that those who have a strong commitment to the firm are happier than others and do not prefer RW because they want to help colleagues so that the firm positively develops. In this case we obtain a negative statistical influence of RW on JS. If the causal relationship between JS and RW is positive, this correlation is weakened or will become negative if the commitment influence is not considered as a control variable. There are many examples of noncausal relationships between RW and WLB via personality traits or JC that are excluded as control variables. For instance, conscientiousness may be positively related to JS and WLB on the one hand and to RW on the other hand. If conscientiousness is neglected, the positive impact of RW on JS and WLB is overestimated.

Based on our brief literature survey, we formulate five major hypotheses (H1-H5). *A priori*, it is unclear whether working from home improves or worsens JS and WLB because the literature reveals good arguments for effects in both directions. Usually, employers cannot request that their employees work at home. They can only allow (with or without restriction) or prohibit it. In the first case the worker has the final decision. If an individual decides to work from home, we expect that the advantages of home work predominate. In traditional economics utility maximization is the major aim. In empirical labor market studies, this is often operationalized by JS. Therefore we formulate:

H1. On average, working from home instead of at the office improves JS.

Reasons might include increased time flexibility, more time sovereignty, more autonomy (Gajendran and Harrison, 2007) and reduced stress (Baruch, 2000). However, other studies find the opposite result, namely that JS is lower, that working from home increases stress (Song and Gao, 2018).

Haar *et al.* (2014) find that high levels of WLB are more positively associated with job and life satisfaction for individuals in individualistic cultures, compared with individuals in collectivistic cultures. Following this result, we assume that WLB is more specific and more important than JS for the RW decision, we test:

H2. On average, working from home improves the WLB.

This relationship is confirmed by Crosbie and Moore (2004) and Gajendran and Harrison (2007). They argue that working at the place the family lives eases the coordination of job and private life. The opposite result is in accord with Dex and Bond (2005) and Russell *et al.* (2007). They find based on case studies that home workers have on average a higher number of weekly working hours and this leads to a greater level of work–life conflicts. Additionally, the permeability of work and family life increases and worsens the WLB (Song and Gao, 2018).

Specific work–life imbalance hypotheses can be tested when we separate between job and private features that induce an imbalance:

H3. Work–life imbalance is stronger if job features are responsible for the usage of home office.

In a similar way, Golden (2012) and Golden *et al.* (2006) argue. They separate between work-to-family conflicts (WFC) and family-to-work conflicts (FWC) and find that both types of conflicts increase the imbalance. However, the former effect is stronger.

Following Golden (2012), further hypotheses can be derived. He investigates the role of exhaustion and whether it makes a difference if telework is conducted during traditional or nontraditional work hours. He shows that when nontraditional telework is extensive, exhaustion increases at a faster rate, as expected. Individuals who had extensive nontraditional telework tended to have lower work exhaustion at low levels of time and strain-based WFC compared to those with more limited nontraditional telework, whereas for those with high WFC higher work exhaustion was experienced. Inspired by this idea, we test:

H4. If RW takes place outside of the contracted working hours, JS is lower and WLB weaker than during contracted working hours.

Arnold *et al.* (2015) demonstrate the relevance of a differentiation between employees who work both from their office and from home during their contracted working time and those employees who work from home exclusively during paid or even unpaid overtime hours.

As our objective is to analyze whether effects of RW on JS and WLB are robust or heterogeneous, we extend our investigation by alternative incorporated variables and different control groups. In this context, we formulate:

H5. (a) RW is positively associated with JS and WLB if RW is agreed explicitly by a contract; (b) the effects of RW on life satisfaction and WLB differ if we distinguish between the introduction and the termination of homework; (c) if remote workers are not compared with all other employees but only those who could work from home but they do not do it and separately; (d) if remote workers desire to work from home but they do not do it.

In detail we expect that the introduction of RW is linked with positive expectations with respect to JS and WLB, while the termination follows a disappointment in the past. Those who wish to work from home have more positive expectations than those who do not want to work from home.

3. Data and descriptive statistics

3.1 Data

We use three waves of the linked personnel panel (LPP – Broszeit and Wolter, 2015; Broszeit *et al.*, 2016). This new data set is representative of private sector establishments with at least 50 employees in the manufacturing and services industries and provides information at the employee and company level. We focus on the former. The survey was started in 2012/2013 ($N = 7,508$). Information from the second wave, 2014/2015 ($N = 7,282$) and the third wave, 2016/2017 ($N = 6,779$) is also available. The employee level of the LPP considers demographic, qualification, employment and JC. Furthermore, home office, JS and WLB information is recorded, among other categories. The definition and the measurement of variables of interest are provided in Tables 1 and 2. We also know whether working from home is contractually based.

In contrast to other data sets, many JC, commitment information (COM), items related to collegiality (COL) and personal attitudes, measured by the Big5, are collected in the LPP – see Table 2. The scales used follow previous suggestions (Dex and Bond, 2005; Song and Gao,

Variables	Definition	Measurement
JS	Job satisfaction	0-completely dissatisfied,. . ., 10-completely satisfied
WLB A	Requirements for my working activities disturb my family life	1-yes, completely,. . ., 5-not at all
WLB B	The duration of my working life makes it difficult to fulfill my family responsibilities	1-yes, completely,. . ., 5-not at all
WLB C	The stress of working duties makes it difficult to fulfill my private tasks	1-yes, completely,. . ., 5-not at all
WLB D	I have to postpone my professional tasks because I have too many family responsibilities	1-yes, completely,. . ., 5-not at all
WLB E	My private life affects my professional tasks negatively	1-yes, completely,. . ., 5-not at all
WLB F	My private life hampers my professional responsibilities (e.g. arriving to work on time, handling day-to-day tasks or working overtime)	1-fully applied,. . ., 5-does not apply at all
WLB	Aggregated work–life balance indicator, sum of WLB A + . . . + WLB F	6-lowest degree of WLB,. . ., 30-highest degree
No WLB_job	Work–life imbalance induced by a job-related reason	= 1 if WLB A $\geq$ 1 and WLB A $\leq$ 2; = 0 if WLB A $\geq$ 4 and WLB A $\leq$ 5
No WLB_private	Work–life imbalance induced by a private reason	= 1 if WLB F $\geq$ 1 and WLB F $\leq$ 2; = 0 if WLB F $\geq$ 4 and WLB F $\leq$ 5

Table 1.
Definition and measurement of dependent variables

Variables	Definition	Measurement
RW – Remote work	Working from home	0 if no homework 1 if homework
AGREE	Agreeableness – Big5 variable expresses that people are not rude to others, they can forgive, they are considerate and kind to others based on the aggregation of three categorical personal characteristics measured by scale 1–5	3 minimal score, . . ., 15 maximal score
CONSC	Conscientiousness – Big5 variable expresses that these employees are thorough workers, not lazy, effective and efficient in completing tasks, determination analogously to AGREE	3 minimal score, . . ., 15 maximal score
EXTRA	Extraversion – Big5 variable that expresses describes people who are communicative, talkative, outgoing, sociable, not reserved, determination analogously to AGREE	3 minimal score, . . ., 15 maximal score
NEURO	Neuroticism – Big5 variable that describes individuals who are easily worried, nervous in many situations, are not easily relaxed, cannot deal with stress, determination analogously to AGREE	3 minimal score, . . ., 15 maximal score
OPEN	Openness – Big5 variable that characterizes people who are original, have new ideas, have artistic and aesthetic experiences, are imaginative; determination analogously to AGREE	3 minimal score, . . ., 15 maximal score
JC1 – Autonomy	I can decide independently in many situations	1-yes, completely,. . ., 5-not at all
JC2 – Multitasking	I have to do many different activities	1-yes, completely,. . ., 5-not at all
JC3 – Influence on colleagues	The work of other colleagues depends directly on whether my work is good or bad	1-yes, completely,. . ., 5-not at all
JC4 – Influence of colleagues	My tasks depend on the work of other employees	1-yes, completely,. . ., 5-not at all
JC5 – Physically demanding	My work is physically demanding	1-yes, completely,. . ., 5-not at all
JC6 – Unpleasant environment	Unpleasant environmental conditions are typical for my job	1-yes, completely,. . ., 5-not at all
JC7 – Deadline pressure	I have often deadline pressure or I have to execute multiple tasks simultaneously	1-yes, completely,. . ., 5-not at all
COM1 – Long-run tenure	I want to work the rest of my professional life in the current firm	1-yes, completely,. . ., 5-not at all
COM2 – Commitment	This firm has a great importance for me	1-yes, completely,. . ., 5-not at all
COM3 – Identification	I consider the problems of the firm as my own problems	1-yes, completely,. . ., 5-not at all
COM4 – No affiliation	I do not feel a strong affiliation to my firm	1-yes, completely,. . ., 5-not at all
COM5 – No emotional loyalty	I do not feel an emotional commitment to the firm	1-yes, completely,. . ., 5-not at all
COM6 – Not part of firm's family	I do not feel as a part of the family in this firm	1-yes, completely,. . ., 5-not at all
COL1 – Support from colleagues	How often do you need and get help from your colleagues?	1-ever,. . ., 5-never
COL2 – Support of colleagues	How often colleagues offer you their support?	1-ever,. . ., 5-never
COL3 – Unfair critique	How often do you feel that you are unfairly criticized by colleagues and supervisors?	1-ever,. . ., 5-never
Age		in years

Table 2.
Definition and measurement of explaining variables

(*continued*)

Variables	Definition	Measurement
Man	Gender: = 1, if male	dummy
Schooling	School education: 6 years without degree; 8 years – elementary school, 10 years – secondary school; . . .; 13 years – high school	in years
German	Citizenship: = 1, if German	dummy
Risk	Risk tolerance: = 0, if completely risk averse; . . .; = 10, if completely risk tolerant	ordinal scale
Permanent job	= 1, if permanent job	dummy
Unskilled	= 1, if skilled	dummy
Craftsman	= 1, if craftsman	dummy
Foreman	= 1, if foreman	dummy
Master	= 1, if master	dummy
Part time	Working time: = 1, if part time job; = 0, if full-time job	dummy
Working hours	Number of working hours per week including overtime	in hours
Training	Further training during the last two years: = 1, if yes	dummy
Log(wage)	Logarithm of monthly gross wage	wage in Euro

2018). For example, interviewees are questioned in relation to a total of 16 areas of personality traits. Based on five categories (fully applies, largely applies, undecided, does not largely apply, does not apply at all), the respondents gave their subjective assessment of their individual personality and whether the items apply to them or not. The categorical variable is transformed into a scale of 1–5. The Big5 factors are determined as the sum of the scores generated from answers to three questions. This means the minimum score for each factor is equal to 3, and the maximum score is equal to 15 – see Table 2.

A priori, it is unclear whether the different items are influential for the relationship between RW and JS/WLB. However, we want to check this. Our list contains variables that have a content-related proximity to influences, explicitly identified in the literature as relevant such as autonomy (JC1), stress (JC2, JC7), coworkers' commitment (JC3, JC4), collegiality (COL1, COL2) and conflict (COL3) – see section 2. Those employees who have answered that they can decide independently in many situations (JC1 = 1) document their autonomy at work. We expect that these employees have more freedom than others to work from home, they have better chances to realize their WLB and they are less disturbed and therefore happier. Multitasking and deadline pressure (JC2 = 1, JC7 = 1) may cause stress. These traits can reduce the JS. *A priori*, it is ambiguous whether these effects are stronger at work from home or at work in the firm. At work from home one can substitute leisure by working time when one has problems to complete tasks within a certain timeframe. Increasing work–life imbalance and likely more stress are a consequence. Coworkers' commitment and collegiality are characteristics that should enhance the JS but RW restricts such positive impacts. The opposite we expect when conflicts between coworkers (COL3 = 1) are latent or even present. One can partially escape from such a problem.

3.2 Descriptive results

First, empirical evidence of the development of our central variables, namely RW, JS and WLB, is presented in Table 3. We find an increase in the share of employees with home offices and WLB is improved, while JS is decreasing. These are only average developments that cannot be used for a detailed analysis based on individual levels. Kendall's tau-b (see Agresti, 1990, p. 28 and p. 34) measures ordinal association, when one variable is ordinal (JS and WLB) and the other is nominal but has only two categories (home office). Kendall's tau-b and the asymptotic standard error in parentheses show us that the association

RW	N	Mean	Std. dev	Kendall's tau-b
2012/13	7,507	0.1741	0.3792	
2014/15	7,280	0.1880	0.3907	
2016/17	6,427	0.2142	0.4103	
JS				
2012/13	7,501	7.5555	1.7493	0.0362 (0.010)
2014/15	7,107	7.5158	1.6805	0.0380 (0.010)
2016/17	6,425	7.5117	1.6757	0.0525 (0.011)
WLB				
2012/13	7,467	24.4483	4.2680	−0.1163 (0.009)
2014/15	7,086	24.4981	4.2386	−0.1461 (0.010)
2016/17	6,404	24.5157	4.1566	−0.1362 (0.010)

Source(s): Linked Personnel Panel (LPP), wave 1–3

Table 3.
Summary statistics of working from home, job satisfaction and work–life balance

between JS and RW is positively significant in all three waves. The association between WLB and RW is negatively significant.

In Table 4, we have presented the descriptive statistics (mean and standard deviation, *t*-test, confidence interval of effect size) for individual characteristics that might be relevant for our analysis of the relationship between JS, WLB and RW. We have split the sample by workers with and without home offices. Except for COM1, COM4 and COL2, we find significant differences at the 5% level for all variables in Table 4 between workers with and without home offices. Based on the *t*-test statistics of mean differences between the two worker groups, we can say that home workers are characterized, on average, by a better qualification, longer working hours, higher wages and more participation in training. Furthermore, they differ fundamentally from other workers by most job characteristics. For instance, autonomy (JC1 low) and stress (JC2 low, JC7 low) are more pronounced at work from home than at the office in the company. We should note that the statistical significance is mainly driven by the large sample size. The effect size shows us that the standardized difference of the means of the two worker groups is only small for many of our presented variables. Exceptions are especially schooling and log(wage).

4. Empirical strategy
As stated in conjunction with the formulation of our first hypothesis, previous literature provides arguments of both a positive and a negative relationship between RW, on the one hand, and JS and WLB, on the other hand. In our empirical analysis we start with a framework in which we embed these relations based on theoretical considerations. But we need a strategy that is primarily based on methodological reflections for the selection of relevant influences. Recently, the issue of the selection of the relevant influencing variables gained new attention under the heading of machine learning.

We distinguish three, theory-driven blocks of influences: (1) personality traits, (2) skills and employment properties and (3) JC. Segmentation between labor supply and labor demand characteristics is intended by block (1) and (3). Variables of block (2) describe a mixture of both sides determined by market and bargaining processes. In previous empirical analyses of RW, control variables can be assigned to (1) and (2) – see Bloom *et al.* (2015), Crosbie and Moore (2004), Dex and Bond (2005), Edwards and Field-Hendrey (2002), Russell *et al.* (2007), Song and Gao (2018). However, the authors do not make an explicit segregation. Big5 traits are not taken into consideration, although in other contexts their importance is stressed, and

| | (1) RW = 0 | | (2) RW = 1 | | (3) | (4) Effect size |
	Mean	SD	Mean	SD	t-test	95% conf. interval
JS	7.489	1.739	7.696	1.535	−6.95	−0.16; −0.08
WLB	24.782	4.211	23.248	0.052	20.95	0.30; 0.40
Age	45.432	10.735	45.965	9.362	−2.91	−0.15; −0.06
Man	0.698	0.459	0.780	0.415	−10.39	−0.20; −0.11
Schooling	10.002	1.643	11.382	1.672	−38.13	−0.86; −0.76
German	0.947	0.224	0.966	0.182	−4.97	−0.08; −0.01
Risk	5.624	1.872	5.881	1.771	−6.32	−0.18; −0.08
Openness	7.535	2.229	7.319	2.096	4.45	0.03; 0.13
Extraversion	6.939	2.215	6.687	2.109	5.55	0.05; 0.15
Conscientiousness	4.830	1.453	5.083	1.449	−7.94	−0.23; −0.14
Agreeableness	5.755	1.752	5.963	1.688	−5.45	−0.15; −0.05
Neuroticism	9.788	2.365	10.154	2.188	−7.12	−0.20; −0.10
Permanent job	0.937	0.243	0.968	0.176	−7.72	−0.17; −0.07
Unskilled	0.151	0.358	0.007	0.086	25.32	0.38; 0.48
Craftsman	0.237	0.425	0.023	0.149	31.56	0.50; 0.60
Foreman	0.039	0.194	0.010	0.101	9.15	0.11; 0.21
Master	0.016	0.126	0.008	0.091	3.67	0.02; 0.11
Part time	0.140	0.347	0.099	0.298	7.04	0.06; 0.16
Working hours	40.455	10.512	44.884	10.21	−23.85	−0.50; −0.40
Training	0.350	0.477	0.547	0.498	−23.37	−0.42; −0.33
Log(wage)	7.942	0.493	8.477	0.498	−56.74	−1.16; −1.06
Autonomy	2.105	1.056	1.685	0.733	23.94	0.39; 0.49
Multitasking	1.840	0.983	1.541	0.706	18.28	0.28; 0.38
Influence on colleagues	2.262	1.280	2.120	1.108	6.49	0.08; 0.18
Influence of colleagues	2.654	1.326	2.719	1.218	2.81	−0.07; 0.02
Physically demanding	3.464	1.500	4.522	0.891	−43.10	−0.79; −0.69
Unpleasant environment	3.033	1.544	4.109	1.237	−41.33	−0.75; −0.65
Deadline pressure	2.544	1.261	1.915	0.920	29.90	0.48; 0.58
Long-run tenure	2.164	1.019	2.186	0.946	−1.27	−0.05; 0.04
Commitment	2.405	1.209	2.447	1.117	−2.01	−0.09; 0.00
Identification	2.199	1.029	2.118	0.871	4.82	0.04; 0.13
No affiliation	2.410	1.058	2.444	0.922	−1.86	−0.07; 0.02
No emotional loyalty	2.264	1.010	2.137	0.826	7.43	0.07; 0.17
No part of firm's family	2.191	1.089	2.274	0.987	−4.40	−0.14; −0.04
Support from colleagues	1.711	0.884	1.662	0.794	3.16	−0.01; 0.08
Support of colleagues	1.770	0.790	1.765	0.705	0.36	−0.04; 0.05
Unfair critique	4.332	0.862	4.444	0.734	−7.57	−0.15; −0.05

Note(s): As effect size, we use Cohen's d and determine the confidence interval – Cohen (1988)
Source(s): Linked Personnel Panel (LPP), wave 1–3

Table 4.
Summary statistics

Baruch (2000) emphasizes that Big5 can provide a useful framework. JC have rarely been incorporated into the RW discussion.

We begin with the presentation of separate estimates and then the three blocks are combined, and only significant influences of the first stage are considered. As an alternative selection procedure, we use the LARS developed by Efron *et al.* (2004). A parsimonious set of the available covariates is selected for the efficient prediction of response variables. Few steps are required. The procedure commences setting all coefficients equal to zero and identifying the predictor most correlated with the response variable, say $x1$. The largest step in the direction of this predictor is taken until some other predictor – say $x2$ – has an equal amount of correlation with the current residual. LARS proceeds in a direction equiangular between

the two predictors, $x1$ and $x2$, until a third predictor, $x3$, earns its way into the "most correlated" set. LARS proceeds equiangular among $x1$, $x2$ and $x3$ that is along the "least angle direction" until a fourth variable, $x4$, enters and so on. As is common practice, Mallows' Cp criterion is used as the stopping rule (i.e. no more regressors are incorporated when Cp reaches its smallest value). As Cp is an unbiased estimator of prediction error, Cp minimization can be regarded as an unbiased estimator of the optimal stopping point.

Up to this stage it is unclear whether the estimates present a pure statistical relationship that is determined by unobserved influences or by causality. A reverse causality induced by observed and unobserved characteristics and dependencies among each other are possible.

Instrumental variables approaches and matching procedures are usually applied to solve the causality task. The problem with the former is finding external instruments that break the correlation between endogenous explanatory variables and unobserved variables affecting the response variable. The latter only takes into account observed determinants. Especially, the propensity score matching techniques are criticized by King *et al.* (2011) and King and Nielsen (2016). Therefore, we present estimates based on entropy balancing, as suggested by Hainmueller (2012). This means reweighting of the untreated observations. The weights are chosen by minimizing the entropy distance metric. The advantage of this approach is that information about the known sample moments is directly incorporated in the reweighting scheme, and no distributional assumption is necessary. Nevertheless, we have to emphasize that endogeneity remains an issue that has plagued the literature and, until now, remains unresolved. We cannot be sure that the estimated coefficients based on entropy balancing have a causal interpretation. We can only demonstrate whether conventional regressions and those based on the reweighted sample differ substantially. If this is not the case, we suppose that in our context endogeneity is not the biggest problem.

A further issue is the heterogeneity problem. This is discussed in De Vos *et al.* (2019) under the time, space and occupation perspective. Here, we follow different ideas. First, we ask whether some subgroups are more successful than others and whether they are happier and have a better WLB. We suppose that it makes a difference whether imbalances are determined by private or job influences. We also distinguish whether RW takes place during the contractually agreed working hours or outside of them, whether employees started with RW, whether they have been working remotely for a long time or whether RW was terminated.

The results may also change if the group working remotely is not compared with all those who do not work from home. We can restrict the control group to those who have a permission to work from home but do not or who want to work from home but do not. In both cases, information on the restriction is only available in waves 2 and 3, and we suppose that the treatment and control groups are more similar than in other estimates where the control group covers all employees who do not work at home.

Finally, we assess the impact of firm-specific regulations concerning telecommunication at the firm level. To the treatment group belong those who work from home based on a specific contract. The control group includes those for whom RW is allowed and only this allowance is based on a general agreement: among other factors, the employees can decide at which time and to what extent they work from home.

5. Estimation results

5.1 Personality traits, skills, employment and job characteristics

In Table 5, line 1, where only personality traits are accounted for – see Section 4 (1) – we find a positively significant influence of working at home on JS, but WLB and RW are negatively associated. This is in accord with the results of Table 3, Kendall's tau-b, and H1 is supported but not H2. We should emphasize that the influence of Big5 variables on JS and WLB is

| | (1) JS | | | (2) WLB | | |
	Coef	Std.Err	N	Coef	Std.Err	N
(1) Personality traits	0.1366***	(0.0274)	10,632	−0.3700***	(0.0269)	10,611
(2) Skills and employment features	−0.0280	(0.0291)	10,632	−0.2946***	(0.0287)	10,611
(3) Job characteristics	−0.0347	(0.0283)	10,546	−0.4636***	(0.0277)	10,527
(4) Significant features	−0.0386	(0.0300)	10,605	−0.3855***	(0.0285)	10,601
(5) LARS selection	−0.0392	(0.0291)	10,605	−0.3247***	(0.0277)	10,527
(6) Entropy balance	−0.0637	(0.0549)	10,546	−0.2748***	(0.0700)	10,527
(7) RW within contracted hours	0.0829	(0.0551)	4,550	−0.3519***	(0.0539)	4,519
(8) RW outside contracted hours	−0.0028	(0.0454)	4,878	−0.4093***	(0.0448)	4,846
(9) Contracted vs noncontracted RW	0.1105**	(0.0551)	1,962	0.0226	(0.0541)	1,947
(10) Introduction of RW	0.1337**	(0.0684)	9,840	−0.0018	(0.0771)	9,770
(11) Termination of RW	−0.1412	(0.0912)	9,840	−0.0233	(0.0872)	9,770
(12) Actual RW vs no RW but allowed	0.0125	(0.0434)	4,074	−0.3115***	(0.0433)	4,048
(13) Actual RW vs desired RW	0.1290**	(0.0560)	2,744	−0.1708***	(0.0519)	2,729

Note(s): *p < 0.10, **p < 0.05, ***p < 0.01. Significant determinants in JS estimates of lines 1–3 are besides remote work control variables of JS estimates in line 4, namely age, schooling, openness, extraversion, conscientiousness, agreeableness, neuroticism, foreman, master, working hours, training, log(wage), autonomy (JC1), unpleasant environment (JC6), deadline pressure (JC7), commitment (COM2), identification (COM3), no affiliation (COM4), no emotional loyalty (COM5), support from colleagues (COL1), support of colleagues (COL2), unfair critique (COL3). Analogously, the control variables of WLB estimates in line 4 are remote work, age, man, schooling, German, risk, extraversion, agreeableness, neuroticism, master, part time, working hours, autonomy (JC1), influence of colleagues (JC4), physically demanding (JC5), unpleasant environment (JC6), deadline pressure (JC7), no emotional loyalty (COM5), support from colleagues (COL1), unfair critique (COL3) – see Table 2
Source(s): Linked Personnel Panel (LPP), wave 1–3

significant – this result is not in the tables. Extraversion, conscientiousness and agreeableness are positively associated with JS and WLB, while the relationship with neuroticism seems to be negative. Strong agreeableness strengthens JS but contributes to a worse WLB. The second module with skills and employment characteristics as control variables – see section 4 (2) – leads in Table 5, line 2, to an insignificant influence of RW on JS. The difference to line 1 can in particular be explained by the gender dummy (man = 1) and schooling (S), variables that are incorporated in line 1 but not in line 2. Both are positively correlated with RW, but negatively with JS. If we neglect gender and S as determinants, the correlation between RW and JS/WLB is moderated. The estimates of the third module with JC as control variables – see section 4 (3) – present similar results in Table 5, line 3, as those of the second module, but the coefficients are larger. The JC, commitment and collegiality variables are strongly correlated with JS and WLB. If, however, some of the characteristics are suppressed in the regression, the RW effect is again positively significant – not in the tables.

Line 4 of Table 5 combines all significant influences of the estimates in lines 1–3. The effects on JS are dominated by the third module, while the effects on WLB are mainly influenced by the variables of the first module.

In contrast to other empirical investigations (Gajendran and Harrison, 2007), we find that remote workers have a worse WLB than other workers, and no difference between these two worker groups are revealed with respect to JS. This means, positive and negative effects of personality traits on JC are effective with the consequence of an insignificant result. Nevertheless, the negative coefficient in column (1), line 4 is a hint that home work goes hand in hand with a worse JS than conventional work at the workplace of the company.

As a robustness check of the specification of line 4 in Table 5, we use LARS to select relevant influences on JS and WLB. The first variables including those with the smallest Cp (Mallows, 1973) are selected for further analysis. Analogously, control variables for WLB are determined. The estimates of the home office effect on JS under the control of the LARS selected regressors in line 5, Table 5 broadly confirm those of line 4. Cluster robust standard errors are determined, where the cluster variable is the personal identification number. Illustratively, the complete estimation is presented in Table 6. Here, we can see that autonomy (JC1 low), no stress (JC7 high), collegiality (COL1 low, COL2 low) and no conflicts with coworkers and supervisors (COL3 high) are linked with good JS.

The entropy balancing procedure uses all variables mentioned in section 4 (1)-(3), which are reweighted if they belong to the control group to balance the first three moments of the treatment and control groups. Based on this new sample, we find in line 6 results comparable to those in lines 4 and 5, where the estimated coefficient of home offices on JS is absolutely larger and that on WLB is absolutely smaller.

5.2 Heterogeneity of subgroups, alternative control and treatment groups
In this section we present the results to our hypotheses 3-5 - see section 2. These aspects have found too little attention in the literature but can show while the outcome of hypotheses 1-2 differs under different constellations.

| Ordered probit regression | | | | | | Number of obs = 10,605 |
| Log pseudo likelihood = −16651.248 | | | | | | Pseudo R^2 = 0.1253 |

JS	Coef	Robust Std. Err	z	$P>\|z\|$	[95% conf. Interval]	
Remote work	−0.0392267	0.0291706	1.34	0.179	−0.0963999	0.0179466
Extraversion	−0.0250991	0.0052768	−4.76	0.000	−0.0354414	−0.0147568
Conscientiousness	−0.0615994	0.0081221	−7.58	0.000	−0.0775184	−0.0456805
Neuroticism	0.0442537	0.0050324	8.79	0.000	0.0343904	0.0541169
Autonomy	−0.135319	0.0119471	−11.33	0.000	−0.158735	−0.1119031
Physically demanding	0.0102438	0.0095201	1.08	0.282	−0.0084152	0.0289028
Unpleasant environment	0.0689281	0.0087237	7.90	0.000	0.0518303	0.0860262
Deadline pressure	0.0884772	0.0098424	8.99	0.000	0.0691865	0.1077679
Long-run tenure	−0.0720043	0.0134887	−5.34	0.000	−0.0984417	−0.0455669
Commitment	−0.0661213	0.0111485	−5.93	0.000	−0.0879719	0.0442707
Identification	−0.1501526	0.0150889	−9.95	0.000	−0.1797264	−0.1205788
No affiliation	−0.1316232	0.0146772	−8.97	0.000	−0.1603901	−0.1028563
No emotional loyalty	−0.1348885	0.0158432	−8.51	0.000	−0.1659406	−0.1038363
Supp. from colleagues	−0.1353089	0.015818	−8.55	0.000	−0.1663116	−0.1043061
Supp. of colleagues	−0.0602325	0.0165863	−3.63	0.000	−0.0927411	−0.0277239
Unfair critique	0.1882595	0.0144256	13.05	0.000	0.1599858	0.2165332
Foreman	0.102133	0.0600732	1.70	0.089	−0.0156082	0.2198742
Master	0.1718118	0.0920588	1.87	0.062	−0.0086201	0.3522438
Man	−0.0779116	0.0282815	−2.75	0.006	−0.1333423	−0.0224809
Age	0.0058735	0.0009976	5.89	0.000	0.0039184	0.0078287
Part time	−0.0699487	0.0419686	−1.67	0.096	−0.1522057	0.0123082
Training	0.1001012	0.0214657	4.66	0.000	0.0580292	0.1421731
Risk	0.0275185	0.0065379	4.21	0.000	0.0147044	0.0403327
Schooling	−0.0625353	0.006758	−9.25	0.000	−0.0757807	−0.0492898
Working hours	−0.0053892	0.001275	−4.23	0.000	−0.0078881	−0.0028903
Log(wage)	0.220272	0.0298112	7.39	0.000	0.1618431	0.2787009

Source(s): Linked Personnel Panel (LPP), wave 1–3

Table 6.
Estimates of remote work effects on job satisfaction (JS) based on LARS selection

5.2.1 Private or job-induced reasons for work–life imbalance. So far, we have measured WLB by six items – see section 3.1 – and in all our empirical results WLB is negatively correlated with RW, while other empirical investigations have found the reverse outcome. This might be due to different assumptions, to different measurement of WLB, to different control groups or to different incorporated control variables. It is possible that only some of our regressors neglected in other studies induce the negative WLB effects of home offices, which dominate the other positive effects.

Three of our items that can lead to work–life imbalance are caused by work conditions (items A–C – see section 3.1) and the others by private life (items D–F – see section 3.1). Our hypothesis is that the former contribute to the negative WLB effects of home offices. We suppose that the latter improve WLB or have no effect for workers when they switch from working in the office to working at home – see section 2, H3. If employees are overstrained with the work assignments, this problem concerns them also during leisure, and they cannot achieve a healthy WLB. When they work at home, this problem might intensify because they can work longer to solve the problem and nobody within the firm notices the excessive demand. If imbalance is due to private reasons, an unobserved substitution of leisure by working time or a temporal shift is more possible when working from home. This may improve WLB.

Our empirical investigations reveal negatively significant effects of home offices on WLB if the distortion of WLB is induced by reason A – see Table 5, column (1) and lines (1)–(6). These results are confirmed if reason A is substituted by reason B or C – this outcome is not in the tables. The estimates with reason F show also a positive sign in lines (1)–(5) – see Table 7, column (2), but all these effects are insignificant. Our estimates support the hypothesis that job and private interests are competing goals. This is only partially supported if reason F is substituted by reason D or E – again not in the tables.

5.2.2 Remote work during or outside of the contracted working hours. A further subgroup analysis should be focused on the question of whether work from home takes place during the contracted working hours or outside of them. The results are presented in lines 7 and 8 of Tables 5 and 7. With respect to JS, H4 is supported by the sign of the coefficients. For WLB no remarkable differences are revealed in comparison to the outcome of the entire sample. One

	(1) No WLB included by a job reason			(2) No WLB included by a private reason		
	Coef	Std.Err	N	Coef	Std.Err	N
(1) Personality traits	0.3556***	(0.0410)	8,761	0.0133	(0.0554)	10,046
(2) Skills and employment features	0.3068***	(0.0441)	8,761	0.0649	(0.0591)	10,046
(3) Job characteristics	0.5278***	(0.0447)	8,689	0.0530	(0.0574)	9,964
(4) Significant features	0.4322***	(0.0467)	8,751	0.0898	(0.0597)	10,036
(5) LARS selection	0.3941***	(0.0466)	8,739	0.0828	(0.0597)	9,980
(6) Entropy balance	0.2669***	(0.0894)	8,689	−0.0835	(0.1866)	9,964
(7) RW within contracted hours	0.2986***	(0.0921)	3,931	0.1055	(0.0982)	4,232
(8) RW outside contracted hours	0.4746***	(0.0735)	4,182	0.1392*	(0.0798)	4,528
(9) Contracted vs noncontracted RW	−0.0887	(0.0969)	1,486	0.0446	(0.1148)	1,835
(10) Introduction of RW	−0.2283*	(0.1246)	7,927	0.2345*	(0.1382)	9,319
(11) Termination of RW	0.0091	(0.1325)	7,927	0.3037**	(0.1419)	9,319
(12) Actual RW vs no RW but allowed	0.4409***	(0.0753)	3,339	−0.0736	(0.0863)	3,811
(13) Actual RW vs desired RW	0.2879***	(0.0903)	2,175	−0.0599	(0.0966)	2,567

Note(s): *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$. Definitions of the dummies no WLB induced by a job reason and no WLB induced by a private reason, see Table 1. Further explanations, see Table 5
Source(s): Linked Personnel Panel (LPP), wave 1–3

Table 7.
Probit estimates of remote work's effects on work–life imbalance due to a job or private feature

exception is that now weakly significant effects of working from home outside of contractual working hours are also induced on WLB if private-life reasons are responsible for an imbalance – see column (2), line 8 of Table 7.

5.2.3 Working from home agreed to by contract or not. It seems to make a difference whether working from home is based on a detailed contract or not. Our hypothesis is: explicit contracts, instead of loose agreements, on RW contribute to more JS and better WLB. A precise contract helps to avoid unpaid overtime working. Employees have a better understanding of what they have to do and what is not necessary. Additionally, the conclusion of a contract can be regarded as a sign of professionalism. Therefore, we compare RW with and without an explicit contract. This means we now have different treatment and control groups than hitherto. The results of RW's effects can be seen in Table 5, line 9 following the specification of LARS selection. We find that the estimates are partially in accord with the hypothesis 5(a). Contracts improve the JS of remote workers. WLB is not significantly improved by an explicit contract, but the positive sign in column (2) indicates the expected direction. Imprecise estimates hinder clearer signals. Furthermore, the different signs of the coefficients in line (9), columns (1) and (2), Table 7 suggest that the imbalance due to job factors seems attenuated under contracted RW compared with loose agreements. The imbalance effect, caused by private factors, seems to be strengthened.

5.2.4 Introduction and termination of remote work. So far, we cannot be sure that the estimated effects of working from home on JS and WLB are truly due to working from home or whether people who work from home can be distinguished from others due to unobserved influences and whether the determined effects are permanent. Our hypothesis is as follows: if unobserved factors but not RW affect JS or WLB, then the introduction of RW makes the differences between the two groups transparent, which may be also revealed after a termination of RW. To test this idea, we discriminate between two situations – introduction and termination of RW. The results of interactions between RW and time dummies on JS and WLB, respectively, from difference-in-differences estimates (DiD) are presented in Table 5, lines 10 and 11, where the effects between wave 1 and 2 are considered. The DiD estimates eliminate unobserved influences that do not change over time. This is an advantage compared with other methods applied in the former estimates, but DiD estimates react sensitively to temporary fluctuations that affect the treatment and the control group in a different way.

We find that the introduction of RW in wave 2 improves JS, while after the termination the estimates show no significant differences. This supports H5(b) and speaks in favor of the causal RW effects. Nevertheless, unobserved variables (e.g. learning effects during the RW period) may also be a reason that we could not find significant effects on JS in line 11. The influence on WLB is insignificant – Table 5, column 2, lines 10 and 11. This supports the presumption of the mutual importance of unobserved factors. We should note that, in lines 10 and 11, the Big5, risk and schooling variables are suppressed because in waves 2 and 3 these items are only surveyed for workers that are interviewed for the first time. If we incorporate these variables, perfect collinearity between the time dummy, RW introduction and termination is the consequence.

5.2.5 Employees who can or want to work at home as a control group. Not all employers allow their employees to work at home and not all employees are ready to work at home. Perhaps they do not have an appropriate room or other residents will disturb them at work. Therefore, the employees not working from home do not necessarily form the best control group. In this subsection, we discuss two alternative control groups:

(1) Individuals who do not work from home but for whom RW is permitted. Employers evaluate advantages of RW higher than the disadvantages, but the employees do not want to work from home.

(2) Individuals who do not work from home but who desire to do so (RW lover). Employees evaluate the advantages higher than the disadvantages, but (currently) they cannot realize RW.

In the first case, the results in Table 5, line 12 do not differ fundamentally from that in line 4 or 5. The effect on JS is insignificant and that on WLB is negatively significant induced by job features (Table 7, column (1) but not column (2), line (12)). This means, no clear result with respect to H5(c) is revealed. In the second case, RW opponents are excluded. Our hypothesis is: RW lovers feel worse than remote workers and even worse than RW deniers. In comparing these three groups, the former has more difficulty realizing their preferences than others. Indeed, our estimates demonstrate that remote workers are obviously more satisfied than RW lovers – see Table 5, line 13. In this respect, we find support of H5(d). Not so clear are the results for WLB. Remote workers also have a worse WLB compared with RW lovers.

5.3 Implications of the empirical results
In this paper, we assess the heterogeneity in the effects of working from home on JS and WLB. Based on our empirical strategy, we show the importance of personal traits, as well as employment and JS, on RW's effects. If these factors are neglected, then positive JS is overestimated. In the context of WLB, the direction of RW's effects is not changed. We find support to previous empirical studies that working from home is accompanied by positive and negative effects on JS (Baruch, 2000) so that in sum no clear influence can be identified. Although not all incorporated JC had proven essential, autonomy and stress due to multitasking and deadline pressure during the working life are relevant for the assessment in accord with Gajendran and Harrison (2007) and Suh and Lee (2017).

The entropy balancing procedure leads to comparable results to those of conventional ordinary least squares estimates, where the estimated coefficient of home offices on JS is absolutely larger and that of WLB is absolutely smaller. We document substantial heterogeneity that depends on the causes of work–life imbalance. Job-conditioned reasons, but not private ones, are decisive for the outcome that telecommuting has negative effects on WLB. Similar findings are presented in the recent literature. The introduction of RW raises JS. This is a hint that not only unobserved characteristics but also RW itself contributes to higher satisfaction in the beginning. However, this effect is not permanent. Neither the introduction nor the termination of RW reveals a significant, specific influence on WLB, while permanent RW and WLB are negatively associated. Therefore, it can be said that unobserved characteristics are mainly responsible and not causal RW effects. In other words, these unobservable variables determine the preference for working from home and, coincidentally, work–life imbalance.

For JS, it is relevant whether a strict contract exists for RW. In this case, RW and JS are positively correlated. It does not make a statistically significant difference whether RW is performed within or outside of the contracted working hours, although the signs of the coefficients are not the same – the former is positive and the latter is negative. This seems plausible, longer working hours are accompanied by less JS.

6. Conclusions
The results raise the question, which policy might be helpful to nudge those employees to work from home that are more satisfied and have a better WLB under this type of work? Firms should extend the possibilities of RW and offer strict contracts under which RW is allowed. They should restrict RW outside of the contracted working hours to a minimum. Discussions about the pros and cons as well as the organization of RW at both the establishment and the team level seem to be indispensable. Firms should reduce job-

conditioned factors that contribute to work–life imbalances. For instance, they should not make timing too tight so that the tasks can be handled by employees within the prescribed timeframe without resulting in job strain. More JS increases work motivation and leads to higher performance.

Further research requires more detailed information concerning RW. The importance of the presence of younger children and the care for persons needing assistance should be analyzed. The gender perspective deserves closer attention. The incorporation as a control variable among others seems not enough. Longer time series are necessary demonstrating the development and changes of home office effects. Although the consideration of job conditions has given us new insights avoiding biased estimates, detailed information on the assignment of personal skills to tasks required at the workplace is helpful. A more specific analysis of JC, commitment and collegiality effects can reveal conditions that are advantageous for both employers and employees. Interaction effects between RW and job conditions, as well as between personal and job features, should be studied.

References

Agresti, A. (1990), *Categorical Data Analysis*, John Wiley & Sons, New York.

Arnold, D., Steffes, S. and Wolter, S. (2015), *Mobiles und entgrenztes Arbeiten. Aktuelle Ergebnisse einer Betriebs- und Beschäftigtenbefragung*, Monitor hrsg, vom Bundesministerium für Arbeit und Soziales, Berlin.

Baruch, Y. (2000), "Teleworking: benefits and pitfalls as perceived by professionals and managers", *New Technology, Work and Employment*, Vol. 15 No. 1, pp. 34-49.

Bloom, N., Liang, J., Roberts, J. and Ying, Z.J. (2015), "Does working from home work? Evidence from a Chinese Experiment", *Quarterly Journal of Economics*, Vol. 130 No. 1, pp. 165-218.

Brenke, K. (2016), "Home offices: plenty of untapped potential", *DIW Economic Bulletin*, Vol. 8, pp. 95-104, 2016.

Broszeit, S. and Wolter, S. (2015), *LPP – Linked Personnel Panel – Arbeitsqualität und wirtschaftlicher Erfolg: Längsschnittstudie in deutschen Betrieben" (Datendokumentation der ersten Welle)*, FDZ-Datenreport 01/2015, Institute for Employment Research, Nürnberg.

Broszeit, S., Grunau, P. and Wolter, S. (2016), *LPP – Linked Personnel Panel 1415*, FDZ-Datenreport 06/2016, Institute for Employment Research, Nürnberg.

Bureau of Labor Statistics (2019), "Job flexibilities and work schedules summary", available at: https://www.bls.gov/news.release/flex2.nr0.htm (accessed 30 September 2019).

Cohen, J. (1988), *Statistical Power Analysis for the Behavioral Sciences*, 2nd ed., Erlbaum, New Jersey.

Crosbie, T. and Moore, J. (2004), "Work–life balance and working from home", *Social Policy and Society*, Vol. 3 No. 3, pp. 223-233.

Daft, R.L. and Lengel, R.H. (1986), "Organizational information requirements, media richness and structural design", *Management Science*, Vol. 32, pp. 554-571.

De Vos, D., van Ham, M. and Meijers, E. (2019), "Working from Home and Commuting: Heterogeneity over Time, Space, and Occupations", Discussion Paper No. 12578, Institute for Labor Economics.

Dex, S. and Bond, S. (2005), "Measuring work–life balance and its covariates", *Work, Employment and Society*, Vol. 19 No. 3, pp. 627-637.

Dockery, A.M. and Bawa, S. (2018), "When two worlds collude: working from home and family functioning", *International Labour Review*, Vol. 157 No. 4, pp. 609-630.

Dubrin, A.J. (1991), "Comparison of the job satisfaction and productivity of telecommuters versus in-house employees: a research note on work in progress", *Psychological Reports*, Vol. 68, pp. 635-646.

Edwards, L.N. and Field-Hendrey, E. (2002), "Home-based work and women's labor force decisions", *Journal of Labor Economics*, Vol. 20 No. 1, pp. 170-200.

Efron, B., Hastie, T., Johnstone, I. and Tibshirani, R. (2004), "Least angle regression", *Annals of Statistics*, Vol. 32 No. 2, pp. 407-451.

Gajendran, R.S. and Harrison, D.A. (2007), "The good, the bad, and the unknown about telecommuting: meta-analysis of psychological mediators and individual consequences", *Journal of Applied Psychology*, Vol. 92 No. 6, pp. 1524-1541.

Giménez-Nadal, J.I., Molina, J.A. and Velilla, J. (2018), "Telework, the Timing of Work, and Instantaneous Well-Being: Evidence from Time Use Data", Discussion Paper No. 11271, Institute for Labor Economics.

Golden, T.D., Veiga, J.F. and Simsek, Z. (2006), "Telecommuting's differential impact on work-family conflict: is there No place like home?", *Journal of Applied Psychology*, Vol. 91, pp. 1340-1350.

Golden, T.D. (2012), "Altering the effects of work and family conflict on exhaustion: teleworking during traditional and nontraditional work hours", *Journal of Business and Psychology*, Vol. 27 No. 2, pp. 255-269.

Haar, J.M., Russo, M., Sune, A. and Ollier-Malaterre, A. (2014), "Outcomes of work-life balance on job satisfaction, life satisfaction and mental health: a study across seven cultures", *Journal of Vocational Behavior*, Vol. 85 No. 3, pp. 361-373, l.

Hainmueller, J. (2012), "Entropy balancing for causal effects: a multivariate reweighting method to produce balanced samples in observational studies", *Political Analysis*, Vol. 20, pp. 25-46.

Hill, E.J., Ferris, M. and Märtinson, V. (2003), "Does it matter where you work? A comparison of how three work venues (traditional office, virtual office, and home office) influence aspects of work and personal/family life", *Journal of Vocational Behavior*, Vol. 63, pp. 220-241.

Jostell, D. and Hemlin, S. (2018), "After hours teleworking and boundary management: effects on work-life conflict", *Work*, Vol. 60 No. 3, pp. 475-483.

King, G. and Nielsen, R. (2016), "Why propensity scores should not be used for matching", Working Paper, available at: http://j.mp/2ovYGsW.

King, G., Nielsen, R., Coberley, C. and Pope, J.E. (2011), "Comparative Effectiveness of Matching Methods for Causal Inference", Working Paper, Harvard University, Cambridge MA.

Mallows, C.L. (1973), "Some comments on CP", *Technometrics*, Vol. 15 No. 4, pp. 661-675.

Moore, J. (2006), "Homeworking and work-life balance: does it add to quality of life? / Travail à domicile et équilibre travail-vie quotidienne: est-ce un plus pour la qualité de vie?", *Revue Europeenne de Psychologie Appliquee/European Review of Applied Psychology*, Vol. 56 No. 1, pp. 5-13.

Noonan, M.C. and Glass, J.L. (2012), "The Hard Truth about Telecommuting", *Monthly Labor Review*, Vol. 135, pp. 38-45.

Paulin, M., Lachance-Grzela, M. and McGee, S. (2017), "Bringing work home or bringing family to work: personal and relational consequences for working parents", *Journal of Family Economics*, Vol. 38, pp. 463-476.

Russell, H., O'Connell, P.J. and McGinnity, F. (2007), "The Impact of Flexible Working Arrangements on Work-Life Conflict and Work Pressure in Ireland", ESRI Working Paper No. 189.

Song, Y. and Gao, J. (2018), "Does Telework Stress Employees Out? A Study on Working at Home and Subjective Well-Being for Wage/Salary Workers", Discussion Paper No. 11993, Institute for Labor Economics.

Standen, P. and Omari, M. (1997), *Homework and Telework – A Guide to Best Practice in Human Resource Management*, Edith Cowan University, Perth, available at: http://ro.ecu.edu.au/ecuworks/6893.

IJM

Suh, A. and Lee, J. (2017), "Understanding teleworkers technostress and its influence on job satisfaction", *Internet Research*, Vol. 27 No. 1, pp. 140-159.

Sullivan, C. and Lewis, S. (2001), "Home-based telework, gender, and the synchronization of work and family: perspectives of teleworkers", *Gender and their Co-residents, Work and Organization*, Vol. 8 No. 2, pp. 123-145.

Wheatley, D. (2012), "Good to be home? Time-use and satisfaction levels among home-based teleworkers", *New Technology, Work and Employment*, Vol. 27 No. 3, pp. 224-241.

Wheatley, D. (2017), "Employee satisfaction and use of flexible working arrangements", *Work, Employment and Society*, Vol. 31 No. 4, pp. 567-585.

Corresponding author

Lutz Bellmann can be contacted at: lutz.bellmann@iab.de