Alexandra Mergener | Lisa Mansfeld

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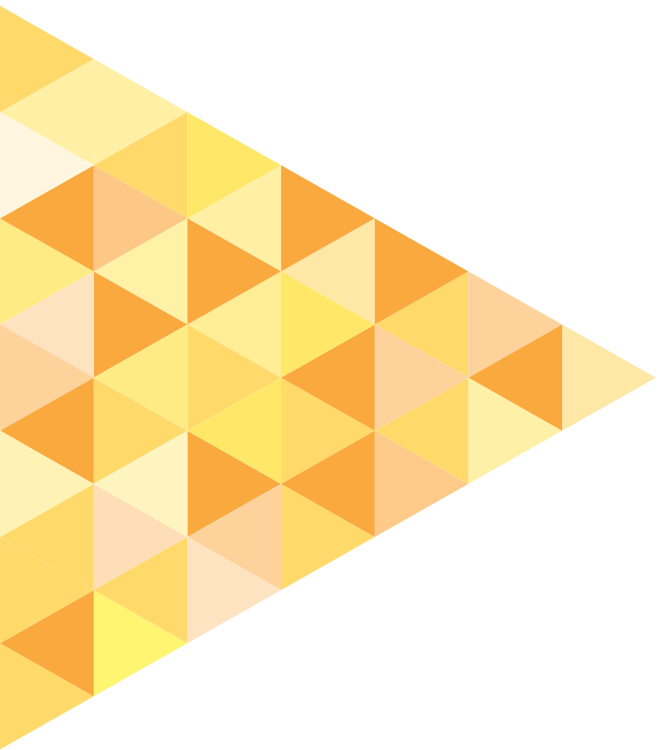

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Working from Home and job satisfaction: the role of contractual agreements, working time recognition and perceived job autonomy

Alexandra Mergener[1], Lisa Mansfeld[2]

Abstract

This paper presents an investigation of the relationship between Working from Home (WfH) and perceived job satisfaction, considering different aspects of WfH arrangements. Using data from the German BIBB/BAuA Employment Survey 2018, we found that recognition of home working hours appears relevant for job satisfaction, rather than just contractual agreements, and remains important when additionally considering job autonomy. Furthermore, employees with unfulfilled WfH desires are more dissatisfied with their job than people in jobs without WfH potential. Our findings reveal heterogeneous links with job satisfaction and reasons for non-WfH use as well as WfH intensity and arrangements, which - from a political point of view - might be interesting regarding the design of WfH.

Zusammenfassung

Dieser Beitrag untersucht den Zusammenhang zwischen Homeoffice und der wahrgenommenen Arbeitszufriedenheit unter Berücksichtigung verschiedener Aspekte von Homeoffice-Regelungen. Auf Grundlage der BIBB/BAuA Erwerbstätigenbefragung 2018 konnten wir feststellen, dass eine vertragliche Homeoffice-Vereinbarung alleine ist nicht ausreichend ist, sondern Beschäftigte, die im Homeoffice arbeiten nur dann zufriedener sind als Personen, die kein Homeoffice haben, wenn die von zuhause aus gearbeiteten Stunden auch als Arbeitszeit anerkannt werden. Dieser Zusammenhang bleibt bestehen, wenn zusätzlich Aspekte der Jobautonomie betrachtet werden. Zudem sind Beschäftigte mit unerfülltem Homeoffice-Wunsch unzufriedener mit ihrer Arbeit als Beschäftigte in einem Beruf ohne Homeoffice-Potenzial. Unsere Ergebnisse weisen auf heterogene Zusammenhänge zwischen Arbeitszufriedenheit und Homeoffice-Nutzung sowie Gründen der nicht-Nutzung hin, die auch aus politischer Perspektive in Bezug auf die Ausgestaltung von Homeoffice-Regelungen interessant sind.

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Content

1 Introduction

The surge in information and communication technologies (ICTs) in our recent past and not least the Covid-19 pandemic have increased both the prevalence and importance of Working from Home (WfH) in the German labour market. WfH, also called telework or telecommuting, can be understood as decentralized, ICT-based work that could be performed in the employer's premises but is regularly carried out remotely, i.e. at the employees' place of residence (Büssing & Aumann, 1996; EU, 2002)[1]. In 2018, about a quarter of German employees worked from home at least occasionally, while 57 percent would have been able to do so given their occupational tasks (Mergener, 2020a). Some of this previously untapped potential turned into WfH use in early 2020 when the first lockdown was imposed due to the COVID-19 pandemic and the number of WfH users doubled at that time (Frodermann et al., 2020).

WfH is often discussed as an aspect of job quality that can increase perceived job satisfaction of employees (e.g. Bae & Kim, 2016; Manochehri & Pinkerton, 2003; Tremblay, 2002). However, empirical results are inconclusive and show differences according to the regulations and the intensity of WfH use. While, for instance, Fonner and Roloff (2010) find that high-intensity teleworkers are more satisfied than office-based employees, Golden (2006) conclude that extensive WfH use can increase social isolation and frustration, which in turn leads to lower job satisfaction. In their recent study, Bellmann and Hübler (2020) also point out the relevance of considering the heterogeneity in non-WfH users as well as the (non-) existence of contractual agreements of WfH. They state that on the one hand remote workers are more satisfied with their jobs than employees who desire to work from home but cannot. On the other hand, remote workers are not more satisfied than employees who could work from home but have decided against it. Moreover, they found that WfH based on strict contractual agreements increases job satisfaction compared to non-contracted WfH (Bellmann & Hübler, 2020). The authors argue that a precise contract works like a sign of professionalism and helps to avoid unpaid overtime working. However, even if there is a high positive correlation between contractually agreed WfH and recognized home working hours, a non-negligible share of employees with contractual agreement do not receive full

[1] A detailed overview regarding different terms and its underlying concepts can be found in Allen, Golden, and Shockley (2015).

recognition of their home working hours while a considerable proportion of employees without contracted WfH does (Mergener, 2020b). Therefore, our first research question asks *if the mechanism behind the positive correlation between strict contractual agreements of WfH and employees' job satisfaction is rather the recognition of home working time*.

Besides regulations and the intensity of WfH itself, other job characteristics can mediate the relationship between WfH and job satisfaction. It is often argued that employees who (can) work from home have higher job control and autonomy in deciding how to work, which (at least partially) explains the higher job satisfaction among WfH users. This mediating role of autonomy in the relationship between WfH and job satisfaction has already been emphasized in the literature (Gajendran & Harrison, 2007; Golden & Veiga, 2005; Kelliher & Anderson, 2008; Peters et al., 2014; Suh & Lee, 2017).To our knowledge, however, so far it remains unknown whether its effect is still important when including the two before-mentioned aspects, WfH contract and recognition. This leads us to the second question: *To what extent does the relationship between WfH and job satisfaction with respect to contractual agreements and recognition of home working hours vary when aspects of job autonomy are considered?*

In order to answer these two questions and to gain deeper insights into the mechanism behind contractual agreements of WfH, this paper examines the relationship between WfH patterns (including both heterogeneous non-WfH and WfH users) and the perceived job satisfaction of employees, considering stepwise the contractual agreements, the recognition of home working hours and aspects of job autonomy. Heterogeneous non-WfH use refers to WfH potential and whether it was one's own decision to not use WfH while heterogeneous WfH use refers to the intensity of WfH use.

The paper proceeds as follows. First, empirical evidence on the relation between WfH and job satisfaction is presented. This is followed by a description of the underlying data set (BIBB/BAuA Employment Survey 2018) and the variables used. Third, both descriptive and multivariate results are presented. To conclude, we summarize these results and discuss its implications.

2 Empirical evidence on WfH and job satisfaction

WfH is often discussed as an aspect of job quality that can, for instance, enhance time sovereignty and facilitate the reconciliation of work and family life by enabling a more flexible organization of work (e.g. Arnold, Steffes, & Wolter, 2015; Eurofound and the International Labour Office, 2017; Gajendran & Harrison, 2007; Grunau, Ruf, Steffes, & Wolter, 2019; Hill, Hawkins, Ferris, & Weitzman, 2001; Tremblay, 2002). This can also be reflected in a higher job satisfaction of employees with WfH arrangements (e.g. Bae & Kim, 2016; Manochehri & Pinkerton, 2003; Tremblay, 2002). However, even if job satisfaction is a commonly researched consequence of WfH at the employee's level, research shows different directions of the effect depending on e.g. WfH intensity, contractual regulations or job characteristics. On the one hand, a positive effect of WfH on job satisfaction was found in different contexts, for example in Germany (Arntz, Sarra, & Berlingieri, 2019; Kröll & Nüesch, 2019), the Netherlands (Peters et al., 2014), the UK (De Menezes & Kelliher, 2017; Felstead & Henseke, 2017; Reuschke, 2019; Wheatley, 2012; Wheatley, 2017) and the US (Vega, Anderson, & Kaplan, 2014). A meta-analysis based on 46 studies confirmed this positive link (Gajendran & Harrison, 2007). On the other hand, Song and Gao (2018) found that WfH increased stress and Bartel, Wrzesniewski, and Wiesenfeld (2012) underlined the negative impact of physical isolation and its impact on organizational identification that can reduce job satisfaction.

A recent German study showed that the effect of WfH on job satisfaction depended on the choice of the control group (Bellmann & Hübler, 2020). Comparing WfH users to either all non-WfH users or employees who could work from home but decided not to, coefficients turned out not to be statistically significant. When comparing WfH users to those who would like to work from home but could not, however, the coefficient became significant: in this case, WfH increased job satisfaction (Bellmann & Hübler, 2020). Congruent with these findings two other studies (based on the same data) which compared job satisfaction of those who have the desire to work from home but do not and those without this desire: job satisfaction was found to be lower for those wishing to work from home (Arnold, Steffes, & Wolter, 2015; Grunau, Ruf, Steffes, & Wolter, 2019).

Yet, other studies found statistically significant differences in job satisfaction irrespective of the desire to work from home but depending on the intensity of WfH. WfH intensity refers to “the extent or amount of scheduled time that employees spend doing tasks away from a central work location” (Gajendran & Harrison, 2007, p. 1529). In 2018, with about 60 percent, most of German employees who worked from home did so with lower intensity, i.e. rarely or sometimes, while 28 percent did so frequently and about one-eight worked from home always (Alipour, Falck, Mergener, & Schüller, 2020; Mergener, 2020b). The level of WfH intensity can affect the collaboration between remote workers and on-site workers (Fonner & Roloff, 2012), which can lead to conflicts (Pas et al., 2014) as well as higher stress levels and lower job satisfaction (Horton, Bayerl, & Jacobs, 2014). Golden (2006) and Golden and Veiga (2005), for instance, support this tendency by stating that an extensive WfH use can increase social isolation and frustration, which in turn leads to lower job satisfaction. They report an inverted U-relationship between the intensity of WfH (measured as the average weekly number of hours working away from the office) and job satisfaction. This means that the effect of WfH on job satisfaction is positive for lower levels of WfH intensity, decreases and turns out to be negative for high levels of WfH. In contrast, but assessing linear effects only, the study of Arntz, Sarra, and Berlingieri (2019) found that job satisfaction was significantly higher for those working from home at least once a week (at least for childless employees) while no statistically significant effect was found for those who worked from home at least once a month. In addition, comparing employees working at least three days a week from home with those working at least three days a week in the office, Fonner and Roloff (2010) found a positive effect of WfH on job satisfaction. Binder (2016) confirmed this positive relationship when comparing employees working from home only and working from home part-time to those working at the office. Redman, Snape, and Ashurst (2009) also noted that hours worked at home (after controlling for total hours worked) increased job satisfaction. Assessing daily job satisfaction, Vega, Anderson, and Kaplan (2014) found that WfH on that day significantly increased job satisfaction, while simultaneously controlling for the average number of days of WfH, the latter was not statistically significant. In addition, concerning time patterns, it was found that the introduction of WfH increased job satisfaction significantly, while the coefficient of WfH termination was negative but not statistically significant (Bellmann & Hübler, 2020).

Not only WfH intensity, but also employment type, contractual regulations of WfH arrangements and home working time recognition were found to affect job satisfaction. Reuschke (2019) noted that job satisfaction increases with WfH among employees but not among self-employed persons. Results regarding contractual regulations are mixed. While a German study found that WfH based on contractual agreements increased job satisfaction compared to those with non-contracted WfH (Bellmann & Hübler, 2020), a British study did not find significant differences in the impact of formal and informal arrangements (De Menezes & Kelliher, 2017). Using descriptive statistics based on Canadian data, Tremblay (2002) found that the percentage of respondents indicating that they were very satisfied was higher for people working at home without a formal agreement while the percentage of respondents indicating that they were somewhat satisfied was higher for those with a formal agreement. Differentiating between WfH within and outside of contractual hours, Bellmann and Hübler (2020) found the expected signs of coefficients (positive for within and negative for outside of contractual hours). These coefficients, however, were not statistically significant (Bellmann & Hübler, 2020).

Finally, several studies found the effect of WfH on job satisfaction to be channeled via perceived job autonomy (e.g. Gajendran & Harrison, 2007; Golden & Veiga, 2005; Kelliher & Anderson, 2008; Peters et al., 2014). Job autonomy is the degree of freedom or discretion a worker has in terms of how tasks are accomplished (Langfred, 2000). In general, WfH is associated with an increase in job autonomy (Gajendran & Harrison, 2007). Furthermore, studies revealed a positive relationship between levels of job autonomy and both employees motivation and sense of responsibility (Deci & Ryan, 2000). Employees who have more discretion in procedures, methods or time schedules to perform their occupational tasks are more positive about their work (Golden, 2007). Assessing the mediating effect directly, a meta-analysis found the effect of WfH on job satisfaction to be fully mediated via autonomy (Gajendran & Harrison, 2007). Referring to the effect of WfH intensity on job satisfaction, Golden and Veiga (2005) argued that with little autonomy, the increase in job satisfaction for low levels of WfH intensity would be weaker while the decrease in job satisfaction for higher levels of WfH intensity would be stronger compared to WfH users with more autonomy. While they did find differences in job satisfaction by WfH intensity between those with low and high

autonomy, contrary to expectations, this difference was strongest for lower levels of WfH intensity (Golden & Veiga, 2005).

3 Data and variables

Analyses in this paper are based on the German BIBB/BAuA Employment Survey 2018 (doi 10.7803/501.18.1.1.10). This representative survey was conducted by the Federal Institute for Vocational Education and Training (BIBB) and the Federal Institute for Occupational Safety and Health (BAuA). More than 20.000 persons in active employment (working at least 10 hours per week) were asked about workplace characteristics, occupations, education, employment history and personal characteristics.

The sample was restricted to employees only (excluding freelancers, self-employed persons, assisting family members and respondents with mini-jobs). Furthermore, only respondents aged 18-65 were included and respondents with missing information in the relevant variables were excluded. This resulted in a total number of 15,830 observations for analysis.

Variables

Job satisfaction is based on the question “How satisfied are you with your work in total?”. Respondents could indicate that they are very satisfied, satisfied, less satisfied or not satisfied. The resulting variable is coded such that a higher value indicates a higher level of job satisfaction.

Three measures regarding WfH are used. The first measure assesses both access to and the legal grounds of WfH use. Those, who do not use WfH are assigned to either no WfH potential, WfH potential but firm does not allow Wfh or WfH potential but the person decided herself not to use WfH. Regarding WfH users, three categories exists: those whose WfH is based on a contractual agreement, those without a contractual agreement and those for whom we lack information on the existence of a contractual agreement. Second, a measure of the WfH intensity is applied. Employees who indicated that they did use WfH were asked about the frequency of this WfH use. Response categories include always, frequently, sometimes and rarely. Third, a dummy assessing recognition of the time of WfH is used. Recognized WfH includes those respondents who indicated

that WfH was fully or only partially recognized by their employers. Non-recognized WfH covers those employees whose WfH was recognized not at all[2].

To assess autonomy, we use three different subjective indicators. Respondents were asked to answer the following questions: “How often does it happen that you can plan and schedule your own work yourself?”, “... that you have influence on the amount of work assigned to you?” and “...that you can decide for yourself when to take a break?”. Possible answers include frequently, sometimes, rarely and never. The resulting variables are recoded such that higher values indicate higher levels of autonomy.

Control variables cover socio-demographic, socio-economic and job-related characteristics. First, employees’ sex, age (in groups), whether he or she has children under the age of 18 and whether he or she lives with an employed partner. Second, the employee’s highest educational degree, classification of occupation (2-digit of KldB 2010), perceived time pressure as well as career aspirations are incorporated. Third, characteristics relating to the current job (or the respective firm) consist of working time, managerial responsibility, firm experience (in years) and firm size.

Table 1: Summary statistics of job satisfaction, different WfH measures and job autonomy

Variable	Observations	Mean	%	Std. Dev.	Min	Max
Job satisfaction	15,830	2.185		0.646	0	3
No WfH potential	6,695		42.29			
WfH potential (but firm)	3,217		20.32			
WfH potential (but own dec.)	1,452		9.17			
WfH Use	4,467		28.22			
WfH with contract (vs. no WfH or WfH w/o contract)	15,830	0.117		0.321	0	1
WfH recognition (vs. no WfH or WfH w/o recognition)	15,830	0.223		0.416	0	1
No Wfh	11,363		71.78			
Intensity: rarely	1,297		8.19			
Intensity: sometimes	1,377		8.70			
Intensity: often	1,228		7.76			
Intensity: always	565		3.57			
Autonomy I: Work/ plan schedule	15,830	2.370		0.987	0	3
Autonomy II: Influence amount of work	15,830	1.592		1.153	0	3
Autonomy III: Decide on break	15,830	2.200		1.172	0	3

Data: BIBB/BAuA Employment Survey 2018, authors’ own calculations. *Note*: Weights are used.

[2] Note that in models where we use WfH intensity rather than the WfH measure of WfH potential and legal grounds, we additionally use a dummy indicating whether WfH use is based on a contractual agreement or not. This dummy is based on information in the broader WfH measure of WfH potential and legal grounds.

4 Results

4.1 Descriptives

For descriptive statistics, weights are used that were calculated on the basis of the microcensus 2018. Having in mind that job satisfaction runs from 0 to 3, with a value of 2.185 (see Table 1), job satisfaction appears to be relatively high among German employees. Looking at WfH use and potential, we see that job satisfaction is highest for those who use WfH (see Table 2). If the job offers WfH potential which is not used, job satisfaction is higher if this was the employee's decision compared to the firm's decision. Turning to WfH intensity, we see the highest level of job satisfaction for those doing WfH rarely. Job satisfaction levels decrease with higher frequencies, even though differences appear to be relatively small.

Table 2: Job satisfaction by WfH potential and use

	Job satisfaction (mean)
No WfH potential	2.141
WfH potential (but firm)	2.113
WfH potential (but own decision)	2.253
WfH Use	2.280
No WfH	2.147
WfH intensity: rarely	2.301
WfH intensity: sometimes	2.274
WfH intensity: often	2.271
WfH intensity: always	2.264

Data: BIBB/BAuA Employment Survey 2018, authors' own calculations. *Note*: Weights are used.

More pronounced differences in job satisfaction can be observed when considering WfH characteristics (see Table 3). In general, job satisfaction is higher for those doing WfH based on a contractual agreement (compared to those without such an agreement) as well as for those doing recognized WfH (compared to non-recognized WfH). Looking at WfH frequencies, we observe relatively similar patterns, irrespective of the existence of contractual agreements or WfH recognition. For those with contractual agreements, no differences can be observed between rarely and sometimes as well as often and always. Regarding those without such agreements, similarly, no differences can be observed between often and always. Turning to WfH recognition, job satisfaction is clearly higher for those doing recognized WfH. Regarding employees doing recognized WfH, job satisfaction is highest for those doing it rarely, followed by often, sometimes

and always. In contrast, those doing unrecognized WfH show highest job satisfaction levels if they work from home sometimes. In this group (non-recognized WfH), no respondent works always from home (else this person would work for free all the time).

Table 3: Job satisfaction (mean value) by contracted WfH and working time recognition

	Contractual agreement		**Home working time recognition**	
	Yes	**No**	**Yes**	**No**
WfH Use	2.323	2.249	2.302	2.198
WfH intensity: rarely	2.34	2.29	2.34	2.19
WfH intensity: sometimes	2.34	2.22	2.28	2.25
WfH intensity: often	2.30	2.23	2.31	2.15
WfH intensity: always	2.30	2.23	2.26	-

Data: BIBB/BAuA Employment Survey 2018, authors' own calculations. *Note*: Weights are used.

Turning to the relationships between job autonomy, job satisfaction and WfH, we calculated bivariate correlations. Concerning job satisfaction, we find positive and statistically significant correlations for all measures of job autonomy, implying that higher job autonomy corresponds to higher job satisfaction. In contrast, correlations with jobs that cannot be done from home are negative throughout autonomy measures. Employees who are less likely to plan and schedule their work, decide when to take a break and have less influence on the amount of work are also less likely to have WfH potential. Jobs with untapped WfH potential correlate very slightly (even if partly significant) with job autonomy. WfH use is correlated with all three autonomy measures: higher levels of job autonomy correspond to higher odds of WfH use.

Assessing WfH intensities, we find that none correlates with all three autonomy measures. Rare WfH use is negatively correlated with work/plan schedule but the association is positive with decide on break. Similarly, using WfH sometimes corresponds to higher levels of deciding on a break. In contrast to rarely using WfH, using WfH often is positively linked to work/plan schedule. Always using WfH corresponds to lower levels of influencing the amount of work as well as deciding on a break. In addition to bivariate correlations, we looked at mean job satisfaction by job autonomy and WfH intensity (see Table A1 in the appendix). While mean satisfaction increased with increasing autonomy among those using WfH rarely, these patterns were less clear for more frequent WfH users, e.g. for those using WfH sometimes or always, mean job satisfaction decreased when moving from never to rarely in the respective autonomy scale and increased only afterwards.

Table 4: Bivariate correlations between aspects of job autonomy, job satisfaction, WfH potential and use

	Autonomy I: Work/ plan schedule	**Autonomy II: Influence amount of work**	**Autonomy III: Decide on break**
Job satisfaction	0.151***	0.175***	0.163***
No WfH potential	-0.276***	-0.166***	-0.234***
WfH potential (but firm)	0.042***	-0.009	0.054***
WfH potential (but own decision)	-0.011	-0.004	0.037***
WfH Use	0.273***	0.193***	0.185***
WfH intensity: rarely	-0.055***	0.009	0.092***
WfH intensity: sometimes	0.175	0.153	0.093***
WfH intensity: often	0.048***	0.013	-0.021
WfH intensity: always	-0.013	-0.051***	-0.225***

* p<.05, ** p<.01, *** p<.001.

Data: BIBB/BAuA Employment Survey 2018, authors' own calculations. *Note*: Weights are used.

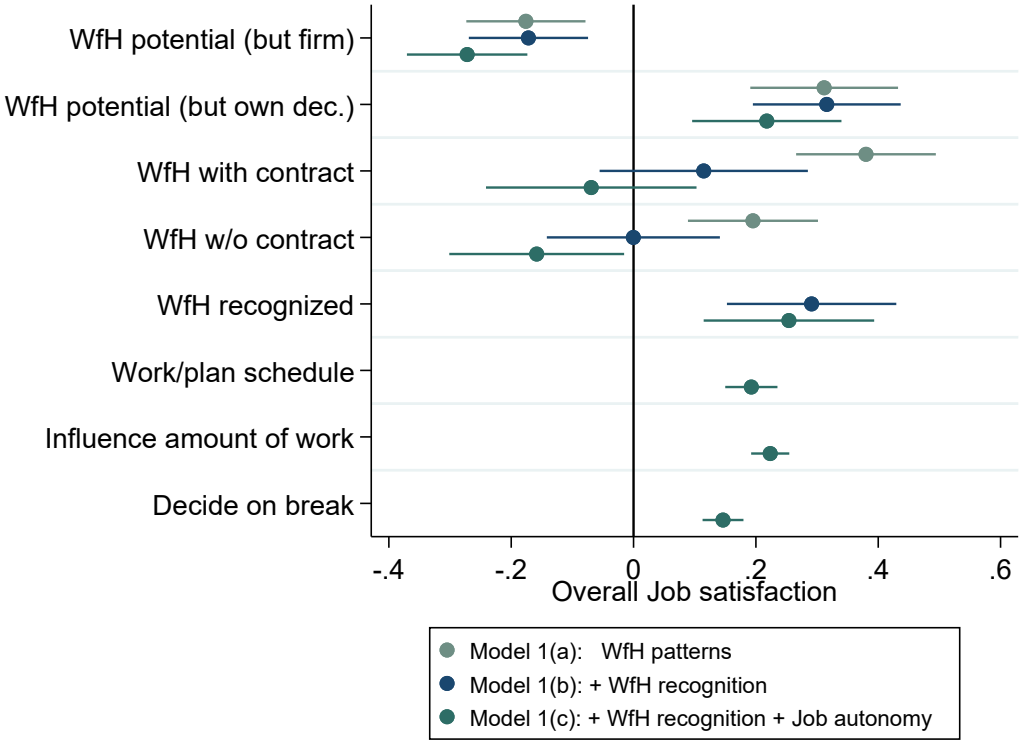
Descriptive mean values of job satisfaction indicate that employees who work from home are more satisfied with their job than employees who work in jobs that have no WfH potential or who do not have permission from their employer. In the group of WfH users, employees are more satisfied if there is either a contractual agreement on WfH or home working time is being recognized. Still, it remains unclear whether these differences coexist or whether the relationship is mediated via one or the other. Moreover, the higher job satisfaction of WfH users could also be related to other job characteristics that lead to higher satisfaction, e.g. managing position, less perceived time pressure or higher job autonomy. Regarding the latter, it appears that the more autonomous people can act in their job, the more satisfied they are with it. Additionally, there is a positive correlation between aspects of job autonomy and WfH use. The following multivariate analyses consider both the possibilities of a direct mechanism and of confounding effects.

4.2 Multivariate analysis

As the dependent variable is a categorical variable, when conducting multivariate analyses, ordered logit models are run. The set of control variables remains the same across models. Model 1(a) (see Figure 1) shows that having a job with WfH potential but the firm not allowing WfH implies lower levels of job satisfaction, while having a job with WfH potential but not the desire to use WfH corresponds to higher levels of job satisfaction compared to employees without WfH potential. The same holds true for those actually working from home: while estimated coefficients differ in size, all types of WfH use are associated with higher job satisfaction. Concerning the existence of a WfH

agreement, we find higher associated job satisfaction for those with such agreements compared to those without such agreements. Model 1(b) additionally includes a dummy indicating whether WfH time is recognized or not. Clearly, job satisfaction is higher for those with WfH being recognized, at the same time coefficients of WfH use (independent of the existence of contractual agreements) cease to be statistically significant. Estimates of WfH potential remain similar to model 1(a).

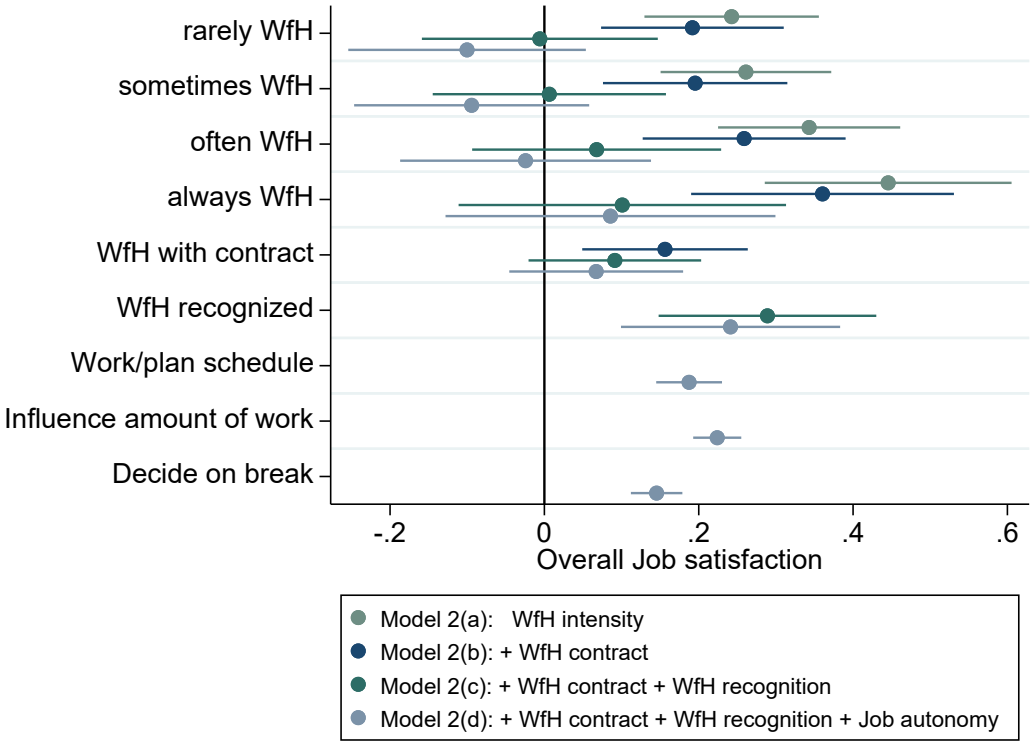
Figure 1: Ordered logit regression on job satisfaction using WfH patterns



Data: BIBB/BAuA Employment Survey 2018, authors' own calculations.
Note: Models only include employees (aged 18 to 65) and control for sex, age, children living in the household, employment of partner, educational level, occupation (KldB2010 2-digit), perceived time pressure, career aspiration, working time, leading position, work experience in the company, and company size. Dots correspond to estimates, lines indicate 95 % confidence intervals. Estimates for control variables not displayed. Full models see Table A2.

Model 1(c) adds autonomy measures. All three individual items are associated with higher job satisfaction. Compared to model 1(b), estimated coefficients of all other displayed variables decrease. This implies that the negative association between WfH potential but the firm not allowing WfH becomes stronger while the positive association between WfH potential but not having the desire to use WfH decreases. The remaining three WfH categories already ceased to be statistically significant in model 1(b), interestingly, however, the coefficient of WfH without contractual agreement decreases strongly and turns out to be negative: including autonomy measures, working from home without a contract is associated with lower levels of job satisfaction.

Figure 2: Ordered logit regression on job satisfaction using WfH intensity



Data: BIBB/BAuA Employment Survey 2018, authors' own calculations.
Note: Models only include employees (aged 18 to 65) and control for sex, age, children living in the household, employment of partner, educational level, occupation (KldB2010 2-digit), perceived time pressure, career aspiration, working time, leading position, work experience in the company, and company size. Dots correspond to estimates, lines indicate 95 % confidence intervals. Estimates for control variables not displayed. Full models see Table A3.

Turning to the intensity of WfH, we estimate Model 2(a) to Model 2(d) focusing on employees who work rarely, sometimes, often or always from home and comparing them with non-WfH users (see Figure 2). Model 2(a), containing only WfH intensity and the set of control variables, shows increased levels of job satisfaction for all measures of WfH intensity. Regarding their size, estimated coefficients are higher the more frequent employees work from home. Including a dummy for the existence of a contractual agreement (model 2(b)) yields decreased coefficients of WfH intensity, however they do remain statistically significant and a similar pattern as in model 2(a) can be observed. The measure of contractual agreements itself is positive and statistically significant, implying a positive link between the existence of contractual agreement and job satisfaction. Model 2(c) further includes a dummy for WfH recognition (similar to the measure in model 1). In this model, WfH intensity measures as well as the contractual agreement dummy cease to be statistically significant while WfH recognition is associated with higher job satisfaction. The last model (2(d)) adds autonomy measures. These are positively related to job satisfaction (showing the same

patterns as in model 1(c)) and the coefficient of WfH recognition decreases slightly (compared to model 2(c)) but remains statistically significant. As in model 2(c), WfH intensity measures as well as the contractual agreement dummy are not statistically significant.

5 Conclusion

WfH opportunities currently play a major role in our society and seem to continue to do so in the future. Not least due to the Covid-19 pandemic but also due to technological developments, German policymakers are proposing to make WfH a legal right.[3] In order to deepen the knowledge about possible consequences of WfH use or non-use, this paper informs about its relationship with perceived job satisfaction of employees in Germany. Thus, we explicitly draw attention to the importance of WfH regulations. Concerning our first research question, we found that the recognition of home working hours is relevant, rather than just a contractual agreement on WfH. Even if there is a positive correlation between the contractually regulated use of WfH and employees' job satisfaction, the effect seems to be overlapped by the recognition of WfH time. This indicates that a contract on its own is not decisive, but only if it does not allow unpaid overtime when WfH. In this case, WfH intensity is less relevant for job satisfaction. Moreover, with regard to our second research question, the importance of the recognition of home working hours remains if aspects of job autonomy are additionally considered. In general, employees who are autonomous in their work, e.g. they can plan and schedule their own work themselves, have influence on the amount of work assigned to them or can decide for themselves to take a break, are more satisfied than those without this job autonomy. Interesting at this point is, however, that, if job autonomy is considered, employees with non-contracted and non-recognized WfH are significantly less satisfied with their job than employees without WfH potential. This indicates that if these employees are not autonomous in their work, unregulated WfH seems to be a burden rather than a benefit.

Looking at non-WfH users, we found statistically significant differences between employees with previously untapped WfH potential. While self-selected non-WfH is associated with higher job satisfaction, employees with WfH potential that they would like to use, but their employer does not

[3] See e.g. https://www.bmas.de/DE/Themen/Arbeitsrecht/mobile-arbeit.html.

allow it, are more dissatisfied with their job. Particularly the latter group could benefit from a current development regarding an expansion of WfH opportunities.

Although this cross-sectional analysis does not allow causal inference regarding a possible effect of WfH on job satisfaction, the results reveal that employees who have the opportunity to work from home are more satisfied with their job than those who do not have this opportunity, even when controlling for substantial variables. It is important to keep this relationship in mind as more satisfied employees tend to be, for instance, more productive, less often ill and usually more committed to the company (e.g. Aydogdu & Asikgil, 2011; Halkos & Bousinakis, 2010). An implication for both politicians and employers is, however, that it is crucial to implement regulations that inhibit unpaid overtime when WfH. To achieve this, a formal agreement on its own does not always seem to be sufficient but must be filled with the appropriate practice. Then, job satisfaction can be increased by enabling WfH, for employees with previously unfulfilled WfH desires and those who already work from home but whose home working time has not been recognized.

Appendix

Table A 1: Job satisfaction (mean value) by aspects of job autonomy and WfH potential and use

	Autonomy I: Work/ plan schedule			
	never	**rarely**	**sometimes**	**frequently**
Total	1.996	2.033	2.089	2.258
WfH Use	2.028	2.063	2.092	2.313
WfH intensity: rarely	2.099+	2.095+	2.058	2.348
WfH intensity: sometimes	2.283+	2.095+	2.129	2.295
WfH intensity: often	1.693+	2.059+	2.012	2.312
WfH intensity: always	1.919+	1.904+	2.277	2.835
	Autonomy II: Influence amount of work			
	never	**rarely**	**sometimes**	**frequently**
Total	2.050	2.114	2.181	2.350
WfH Use	2.147	2.156	2.227	2.420
WfH intensity: rarely	2.176	2.218	2.271	2.404
WfH intensity: sometimes	2.136	2.060	2.266	2.422
WfH intensity: often	2.120	2.226	2.126	2.438
WfH intensity: always	2.167	2.103	2.245	2.406
	Autonomy III: Decide on break			
	never	**rarely**	**sometimes**	**frequently**
Total	2.011	2.048	2.097	2.266
WfH Use	2.123	2.086	2.167	2.325
WfH intensity: rarely	2.014	2.156	2.161	2.340
WfH intensity: sometimes	2.126	2.082	2.142	2.306
WfH intensity: often	2.099	2.036	2.132	2.328
WfH intensity: always	2.202	2.086	2.235	2.332

Data: BIBB/BAuA Employment Survey 2018, authors' own calculations. *Note*: Weights are used.
+ Sample size in cells < 30.

Table A 2: Ordered logit regression on job satisfaction using WfH patterns

	Model 1(a)	**Model 1(b)**	**Model 1(c)**
WfH (Ref.: No WfH potential)			
WfH potential (but firm)	-0.176***	-0.172***	-0.272***
WfH potential (but own decision)	0.312***	0.316***	0.218***
WfH with contract	0.380***	0.115	-0.069
WfH w/o contract	0.195***	0.000	-0.158*
WfH (no info about contract)	0.596**	0.340	0.198
WfH recognized (vs. not recognized)		0.291***	0.254***
Autonomy:			
Work / plan schedule			0.193***
Influence amount of work			0.223***
Decide on break			0.146***
Gender-family-combination (Ref.: men w/o children)			
Men w children	0.109*	0.109*	0.111*
Women w/o children	0.028	0.026	0.073
Women w children	0.136*	0.132*	0.184**
Age (Ref.: 18-34 years old)			
35-44 years old	0.057	0.06	0.052
45-54 y years old	0.051	0.053	0.034
55-64 years old	0.076	0.079	0.051
65 or older	1.140***	1.135***	1.119***
Lives with employed partner (Ref.: no)	0.125***	0.123***	0.104**
Highest educational degree (Ref.: no)			
Vocational education	0.159	0.161*	0.089
Further vocational education	0.196*	0.195*	0.074
University degree	0.013	0.010	-0.131
Occupational classification (2-digit of KldB 2010)			
Agriculture, forestry, farming	-0.479	-0.481	-0.644
Gardening and floristry	-0.373	-0.369	-0.494
Production and processing of raw materials, glass- and ceramic-making and -processing	-0.385	-0.378	-0.467
Plastic-making, -processing, wood-working, -processing	-0.917**	-0.908**	-0.906**
Paper-making, -processing, printing, technical media design	-0.748*	-0.737*	-0.807*
Metal-making, -working, -construction	-0.693*	-0.686*	-0.619*
Technical occ. in machine-building and automotive industry	-0.432	-0.425	-0.432
Mechatronics, energy electronics and electrical engineering	-0.327	-0.326	-0.465
Technical research, development, construction, and production planning and scheduling	-0.316	-0.306	-0.447
Textile- and leather-making and -processing	-1.250**	-1.252**	-1.204**
Food-production and -processing	-0.874**	-0.859**	-0.805**
Construction scheduling, architecture and surveying	-0.173	-0.183	-0.372
Building construction above and below ground	-0.617	-0.614	-0.689*
Interior construction	-0.329	-0.324	-0.418
Building services engineering and technical building services	-0.350	-0.339	-0.593
Mathematics, biology, chemistry and physics	-0.546	-0.532	-0.775*
Geology, geography and environmental protection	-0.389	-0.357	-0.599
Computer science, ICT	-0.327	-0.351	-0.583*

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	Model 1(a)	Model 1(b)	Model 1(c)
Traffic and logistics (without vehicle driving)	-0.743**	-0.735**	-0.676*
Drivers and operators of vehicles and transport equipment	-0.544	-0.536	-0.427
Safety and health protection, security and surveillance	-0.290	-0.283	-0.312
Cleaning services	-1.063**	-1.057**	-1.205***
Purchasing, sales and trading	-0.314	-0.310	-0.536
Sales retail trade	-0.819**	-0.803**	-0.859**
Tourism, hotels and restaurants	-0.993**	-0.982**	-1.078***
Business management and organization	-0.262	-0.260	-0.442
Financial services, accounting and tax consultancy	-0.450	-0.449	-0.633*
Law and public administration	-0.273	-0.269	-0.373
Medical and health care occupations	-0.397	-0.385	-0.412
Non-medical healthcare, body care, wellness and medical technicians	-0.379	-0.362	-0.514
Education and social work, housekeeping, and theology	-0.323	-0.310	-0.449
Teaching and training	-0.166	-0.176	-0.143
Philology, literature, humanities, social sciences, and economics	0.159	0.162	0.015
Advertising, marketing, commercial, editorial media design	-0.526	-0.52	-0.698*
Product design, artisan craftwork, fine arts and the making of musical instruments	0.445	0.461	0.237
Performing arts and entertainment	-0.232	-0.231	-0.137
Deadline / performance pressure (Ref.: never)			
Rarely	-0.152	-0.153	-0.227*
Sometimes	-0.405***	-0.405***	-0.486***
Frequently	-0.896***	-0.894***	-0.893***
Strong (vs. not strong) career aspirations	0.107**	0.108**	0.054
Working time	-0.003	-0.002	-0.003
Managerial responsibility (Ref.: no responsibility)			
Lower management	0.053	0.055	-0.013
Middle management	0.483***	0.490***	0.371***
Upper management	0.926***	0.945***	0.757***
Firm experience (years)	-0.001	-0.001	-0.001
Firm size (Ref.: 1-9 employees)			
10-49 employees	-0.165**	-0.164**	-0.110
50-249 employees	-0.112	-0.109	-0.029
500/more employees	-0.062	-0.058	-0.015
Statistics			
Observations	15.830	15.830	15.830
Pseudo R-squared	0.032	0.033	0.052
Log likelihood	-1.42E+04	-1.42E+04	-1.39E+04

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A 3: Ordered logit regression on job satisfaction using WfH intensity

	Model 2(a)	**Model 2(b)**	**Model 2 (c)**	**Model 2(d)**
WfH intensity (Ref.: no WfH)				
rarely WfH	0.243***	0.192**	-0.006	-0.100
sometimes WfH	0.261***	0.195**	0.006	-0.094
often WfH	0.343***	0.259***	0.068	-0.024
always WfH	0.446***	0.360***	0.101	0.086
WfH with contract (vs. without)		0.156**	0.091	0.067
WfH recognized (vs. not recognized)			0.289***	0.241***
Autonomy:				
Work / plan schedule				0.188***
Influence amount of work				0.224***
Decide on break				0.145***
Gender-family-combination (Ref.: men w/o children)				
Men w children u18	0.106*	0.106*	0.105*	0.107*
Women w/o children u18	0.031	0.031	0.03	0.071
Women w children u18	0.128*	0.128*	0.125*	0.172**
Age (Ref.: 18-34 years old)				
35-44 years old	0.065	0.062	0.065	0.057
45-54 years old	0.057	0.054	0.056	0.039
55-64 years old	0.082	0.082	0.085	0.059
65 or older	1.140***	1.151***	1.145***	1.144***
Lives with employed partner (Ref.: no)	0.118***	0.117***	0.115***	0.095**
Highest educational degree (Ref.: no)				
Vocational education	0.145	0.147	0.149	0.078
Further vocational education	0.174	0.174	0.174	0.048
University degree	0.013	0.010	0.008	-0.14
Occupational classification (2-digit of KldB2010)				
Agriculture, forestry, farming	-0.449	-0.447	-0.450	-0.584
Gardening and floristry	-0.328	-0.325	-0.325	-0.422
Production and processing of raw materials, glass- and ceramic-making and -processing	-0.364	-0.363	-0.361	-0.403
Plastic-making, -processing, wood-working, -processing	-0.868**	-0.867**	-0.862**	-0.825*
Paper-making, -processing, printing, technical media design	-0.725*	-0.722*	-0.716*	-0.769*
Metal-making, -working, -construction	-0.676*	-0.669*	-0.665*	-0.561
Technical occ. in machine-building and automotive industry	-0.404	-0.401	-0.397	-0.381
Mechatronics, energy electronics and electrical engineering	-0.297	-0.297	-0.298	-0.418
Technical research, development, construction, and production planning and scheduling	-0.292	-0.291	-0.283	-0.416
Textile- and leather-making and -processing	-1.219**	-1.216**	-1.223**	-1.149**
Food-production and -processing	-0.842**	-0.835**	-0.824**	-0.734*
Construction scheduling, architecture and surveying	-0.160	-0.152	-0.165	-0.347
Building construction above and below ground	-0.587	-0.585	-0.587	-0.619
Interior construction	-0.29	-0.288	-0.287	-0.337

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	Model 2(a)	Model 2(b)	Model 2 (c)	Model 2(d)
Building services engineering and technical building services	-0.336	-0.330	-0.322	-0.543
Mathematics, biology, chemistry, physics	-0.518	-0.515	-0.505	-0.727*
Geology, geography, environmental protection	-0.369	-0.372	-0.344	-0.577
Computer science, ICT	-0.286	-0.298	-0.326	-0.552
Traffic and logistics (without vehicle driving)	-0.723*	-0.718*	-0.714*	-0.626*
Drivers and operators of vehicles and transport equipment	-0.501	-0.500	-0.497	-0.342
Safety and health protection, security and surveillance	-0.290	-0.284	-0.281	-0.284
Cleaning services	-1.023**	-1.016**	-1.014**	-1.127***
Purchasing, sales and trading	-0.317	-0.318	-0.311	-0.540
Sales retail trade	-0.791**	-0.786**	-0.774**	-0.802**
Tourism, hotels and restaurants	-0.959**	-0.953**	-0.944**	-1.010**
Business management and organization	-0.244	-0.243	-0.244	-0.423
Financial services, accounting and tax consultancy	-0.426	-0.428	-0.431	-0.618*
Law and public administration	-0.254	-0.252	-0.249	-0.354
Medical and health care occupations	-0.372	-0.366	-0.358	-0.353
Non-medical healthcare, body care, wellness and medical technicians	-0.335	-0.330	-0.318	-0.434
Education, social work, housekeeping, theology	-0.308	-0.298	-0.288	-0.409
Teaching and training	-0.237	-0.200	-0.196	-0.171
Philology, literature, humanities, social sciences, and economics	0.159	0.170	0.166	0.035
Advertising, marketing, commercial, editorial media design	-0.513	-0.515	-0.510	-0.687*
Product design, artisan craftwork, fine arts and the making of musical instruments	0.467	0.468	0.480	0.268
Performing arts and entertainment	-0.222	-0.201	-0.205	-0.093
Deadline / performance pressure (Ref.: never)				
Rarely	-0.164	-0.164	-0.165	-0.240*
Sometimes	-0.421***	-0.420***	-0.420***	-0.507***
Frequently	-0.919***	-0.916***	-0.913***	-0.916***
Strong (vs. not strong) career aspirations	0.102**	0.101**	0.102**	0.046
Working time	-0.003	-0.003	-0.003	-0.004
Managerial responsibility (Ref.: no responsibil.)				
Lower management	0.046	0.047	0.047	-0.019
Middle management	0.483***	0.487***	0.493***	0.374***
Upper management	0.913***	0.927***	0.944***	0.755***
Firm experience (years)	0.000	-0.001	0.000	-0.001
Firm size (Ref.: <10 Employees)				
10-49 Employees	-0.168**	-0.169**	-0.168**	-0.114
50-249 Employees	-0.116	-0.117	-0.113	-0.035
500/more Employees	-0.047	-0.055	-0.053	-0.009
Statistics				
Observations	15.830	15.830	15.830	15.830
Pseudo R-squared	0.030	0.030	0.031	0.050
Log likelihood	-1.42E+04	-1.42E+04	-1.42E+04	-1.39E+04

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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