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Perceived productivity when working from home: Insights into the global experience

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Abstract

Purpose – This study aims to provide insights into the experiences of working from home (WFH) in a global context from the perspective of perceived productivity.

Design/methodology/approach – This paper uses a multivariate analysis benefiting from an extensive data set of almost 137,500 respondents from 88 countries.

Findings – This paper find that most respondents are satisfied with their productivity when WFH: 70% agree or strongly agree with "My home environment enables me to work productively". The results further show that socio-demographic factors, as well as the social and physical settings at home, are associated with the perceptions of productivity. Being younger, dissatisfied with the physical setting and the presence of others at home seem to decrease the probability of being satisfied with productivity, whereas being female seems to increase it. However, some differences between countries exist when controlling for socio-demographic factors, presence of others and physical setting at home.

Practical implications – The results enhance understanding of perceived productivity in different countries while WFH and provide valuable insights for employers, employees and policymakers on how to support WFH effectively.

Originality/value – The value of this paper lies in its investigation of socio-demographic factors, as well as the social and physical home environment, in relation to perceptions of productivity within a truly global context, while also comparing differences between countries.

Keywords Hybrid working, Perceived productivity, Remote working, Teleworking, WFH, Workplace management

Paper type Research paper

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1. Introduction

The pandemic-enforced shift to working from home (WFH) was dramatic, affecting a wide range of knowledge workers with little consideration for employees' preferences or abilities to adapt to remote work. The situation was challenging especially for multi-person households (Russo *et al.*, 2022) or employees living in smaller apartments difficult to physically adapt to changing circumstances (Pelsmakers *et al.*, 2021). It is not surprising that COVID-19 and the subsequent rise of hybrid working arrangements have sparked discussions about how future work will be conducted and supported, regardless of location (Awada *et al.*, 2021).

Increased interest towards WFH has resulted in a variety of studies from different parts of the world. Tagliaro and Migliore (2021) used survey data of 90 employees from Italy to compare WFH and traditional corporate office-based work including factors such as physical characteristics of work spaces, productivity and work–life balance. Alfano *et al.* (2023) studied the factors that influence work–life balance satisfaction of 803 workers in Italy. Cuerdo-Vilches *et al.* (2021) employed both qualitative (including an analysis over 200 images) and quantitative research methods (based on 1,800 survey responses) to study the perceived adequacy of telework spaces and IT tools in Spain. Arkesteijn *et al.* (2021) used Dutch survey data of 31,301 employees to investigate the relationship between physical aspects of the work environment at home and perceived individual productivity. Xiao *et al.* (2021) studied physical and mental well-being when WFH with survey data of 988 respondents mainly from the USA, whereas Bergefurt *et al.* (2022) viewed the relationship between physical work setting at home, support of work activities and mental health based on 1,219 office employees (country of location was not disclosed). Niebuhr *et al.* (2022) focused on WFH circumstances (e.g. working hours and functionality of technological devices) and their relation to employees' health and job satisfaction in Germany with 519 respondents. Bloom *et al.* (2023) studied 1,612 technology firm employees in China concerning job satisfaction, working hours and days, electronic communication and work positions. Stoker *et al.* (2022) viewed the impacts of WFH in relation to leadership behaviour with 748 responses from the Netherlands. In addition, there are some studies using a multinational approach. For example, Aksoy *et al.* (2022) conducted a cross-country comparison and studied current WFH levels and employee preferences. The first part of their study included 12,229 respondents from 15 countries [1] and the second part 23,849 respondents from 25 countries [2]. DeFilippis *et al.* (2020) studied employees' digital communication patterns in 16 large metropolitan areas in North America, Europe and the Middle East [3]. Another global study conducted by Munobwa *et al.* (2022) focused on university staff and students and their coping methods and satisfaction with WFH with 674 respondents from 24 countries [4]. Georgiadou *et al.* (2022) assessed cyber security culture in 13 European countries with 264 questionnaire participants and an earlier study by Toivonen *et al.* (2022) including 137,289 respondents from 77 countries globally focused on the perceived suitability of the physical work setting when WFH.

Previous studies have given valuable understanding about the factors influencing WFH but still many of them have typically concentrated on employees in specific countries, whereas few of the studies with a multinational approach present country differences. Research comparing the situation on a global scale with extensive data sets is still scarce. It is known that the prevalence of WFH vary between countries. According to Aksoy *et al.* (2022) the average number of days WFH per week during COVID-19 varied globally between 0.5 days in South Korea, 1.6 days in USA to 2.4 days in Singapore and 2.6 in India. Their results also show that the popularity of WFH during COVID-19 acts as a good indication of the level of eagerness to continue WFH also after the pandemic. Commuting times and the

preconditions at home, including the physical setting, the family structure and workforce socio-demographics vary between countries and can therefore influence WFH. Yet, their relation to WFH remain rather unknown on a global scale. There are only a few studies examining cross-cultural differences in WFH productivity. For example, Voll and Pfnür (2023) compared the USA (507 respondents) and Germany (429 respondents) to analyse the influence of workplace characteristics on employee outcomes, including productivity, and found significant differences between the two countries. Howarth *et al.* (2017) compared differences in the prediction of well-being measures related to productivity between employees from developed and developing countries. Their study included 117,274 respondents from 120 countries. Bezak *et al.* (2022) investigated the challenges related to WFH with 921 responses from 76 countries and noted differences between ethnicities. Therefore, based on the results of these studies, it seems worthwhile to further investigate country-specific differences in workplace-related needs, as also suggested by Voll *et al.* (2022). This study therefore aims to establish an understanding on the experiences of WFH in a global context. We approach the aim from the perspectives of perceived productivity. We benefit from an extensive data set gathered by a private company, including observations from about 137,500 knowledge workers from 88 countries, which enables us a global research setting. More precisely we will study the impact of socio-demographics, social and physical setting on perceived productivity when WFH as well as whether the impact varies between countries. This is done with multivariate regression analysis.

The data set we have access to was gathered between April 2020 and March 2021 and therefore it represents the implications of the COVID-19-enforced WFH period. Regardless, our results provide valuable insights into WFH also in the postpandemic era, as WFH prevails on a larger than ever scale. A great majority of employees want to retain WFH as a part of their hybrid working style (Aksoy *et al.*, 2022; Appel-Meulenbroek *et al.*, 2022; Beaudoin *et al.*, 2020). Several parallel forces are present in the surrounding society, such as digitalization, demographic changes, individualism, environmental crises and the need for optimization (Toivonen and Viitanen, 2015) that drive the future ways of working towards hybrid modes, including WFH. Furthermore, it is believed that if organizations have already invested in remote working, they are more likely to also continue it in the future (Bartik *et al.*, 2020).

The remainder of the paper is organized as follows. Section 2 introduces previous literature on WFH from the perspectives of productivity. Our research design and data are presented in Section 3. Section 4 presents our results. The findings are further discussed in Section 5, with Section 6 offering some concluding remarks and considerations for future research.

2. Productivity when working from home

One of the most highlighted benefits of remote working in the existing literature is the increase in productivity (Bloom *et al.*, 2015; Giovanis, 2018; Martin and MacDonnell, 2012; Mihai *et al.*, 2020) for both individual employees, work-teams and for the whole organization (Tagliaro and Migliore, 2021). According to Aksoy *et al.* (2022), productivity was seen to develop positively when WFH both in Asia, Europe and America. According to a US study by Awada *et al.* (2021), especially female, older and high-income workers are likely to report increased productivity when WFH.

The increased productivity when WFH has been connected to several factors. In studies with mainly US data by Awada *et al.* (2021) and Xiao *et al.* (2021), the number of hours spent at the workstation have been reported to increase by approximately 1.5 h per day when WFH compared to when working from the office. This notion of increased working hours is

in line with other studies from North America, Europe, South Asia and the Middle East (DeFilippis *et al.*, 2020; Kaur and Sharma, 2020; Kelliher and Anderson, 2010; Tagliaro and Migliore, 2021). Especially the flexibility in time and place is considered a benefit by most employees. For example, the time saved from commuting might contribute to the increased productivity (Tagliaro and Migliore, 2021; Tavares, 2017). DeFilippis *et al.* (2020) found that while the number of meetings increased when WFH, the meetings were shorter than in the prepandemic era, resulting in less total time spent in meetings. On the contrary, according to an Italian study, some work processes, such as decision-making, might become slower due to the need of several contacts and delays in receiving responses (Tagliaro and Migliore, 2021).

Despite the increased working hours when WFH, the productivity impacts are not straightforward. If employees perceive the demands of WFH as excessive, they may experience heightened strain, leading to a sense of reduced effectiveness at work (Bakker and Demerouti, 2007; Wilson *et al.*, 2024). In addition, the daily increase in working hours might intensify any negative impacts experienced at home (Majumdar *et al.*, 2020). These impacts can be related to physical, social or mental aspects. Hoornweg *et al.* (2016) found with a Dutch data set of 111 teleworkers that productivity is dependent on the intensity level of WFH and may decrease when the hours increase. Until now, findings concerning the level of stress and strain and the consequent impact on productivity remain partly contradictory (Moretti *et al.*, 2020; Toscano and Zappalà, 2020; Weijs-Perrée *et al.*, 2021; Mihai *et al.*, 2020) but in general, better mental and physical health is known to improve productivity (Awada *et al.*, 2021).

The ability to physically separate work from the other parts of life at home and detach from work has been seen to contribute to a healthy work–life balance (Vander Elst *et al.*, 2017; Wilson *et al.*, 2024). In previous studies, the availability of suitable physical work setting at home and the presence of other family members have been seen as important factors contributing to the productivity when WFH. According to Awada *et al.* (2021) having a teenager at home influenced the perceived productivity positively, whereas Tagliaro and Migliore (2021) found that young children seemed to impact the perceived productivity negatively.

In relation to the physical work setting at home, Bergefurt *et al.* (2022) found that people working from a dedicated room at home during the pandemic experienced better mental health and well-being. Arkesteijn *et al.* (2021) found that employees in the Netherlands felt more productive when working in a dedicated room than when working in a bedroom or in a shared room. Cuerdo-Vilches *et al.* (2021) found in their Spanish data that the majority of their respondents felt that their homes were at least adequate for WFH; however, only about a third of workers were satisfied with their office furniture at home. Tagliaro and Migliore (2021) found that among the Italian employees they studied the majority were satisfied with the physical work setting at home. Toivonen *et al.* (2022) identified similar positive perceptions related to the physical WFH setting with a global data set. Tagliaro and Migliore (2021) further found that aesthetics, privacy, indoor environment quality and external views scored higher at home versus the corporate office, whereas things to develop at home included availability of storage, ICT facilities and ergonomics. Toivonen *et al.* (2022) showed that not having a dedicated workroom decreased the probability of satisfaction with the physical work setting while WFH. Satisfaction with a desk, chair and access to IT devices and tools had similarly a positive contribution. The physical work setting at home is significant because it can be connected to ergonomic challenges (Larrea-Araujo *et al.*, 2021). Simply an unsuitable desk and incorrect chair height can increase the risk for computer work–related musculoskeletal disorders (Harrington and Walker, 2004) potentially

impacting productivity. In line with this, employees with an office desk or an adjustable chair available at home have been reported to spend more hours by their workstation in the USA (Awada *et al.*, 2021).

3. Materials and methods

We use a quantitative research approach, using secondary data collected by Leesman, a private company specialized in measuring employee experiences with their client organizations. The company launched an online home working survey in the beginning of the pandemic, April 2020. Between 1 April 2020 and 31 March 2021, a total of 181,406 knowledge workers from 74 organizations across 90 countries were surveyed. Our research focuses on the responses to one specific statement from the survey: *My home environment enables me to work productively.* The statement offered seven possible answers: *Disagree strongly, Disagree, Disagree slightly, Neutral, Agree slightly, Agree* and *Agree strongly.* We label respondents that agree or agree strongly to the statement as ”satisfied” with their productivity while working from home.

3.1 Data

All 181,406 respondents are knowledge workers, most working in the private sector and about 15% in the public sector. In the original data set, 29,650 respondents did not work from home at the time of the survey and the data set available to us contains the 151,756 respondents who did work from home. In addition to answers to the statement in focus, the data we have analysed for the purpose of this paper includes the country where the respondent was employed and respondents' self-reported gender, age group, time with organization and social and physical setting at home. The data set received was anonymized, and the results are presented in a manner that does not compromise the privacy of the respondents. Participation in the survey was voluntary.

To create a data set for the analysis, we do the following exclusions: respondents lacking information on country; respondents for whom there is missing information on the statement in focus; respondents with missing information on other variables (gender, age group, time with organization, type of work setting, presence of others, dissatisfaction with access to needed IT devices and tools and dissatisfaction with access to needed software applications/programs). Finally, we exclude respondents from two countries with less than ten remaining observations. The final data set includes 137,446 respondents in 88 countries. The summary statistics for the final data set can be found in as online attachment.

3.2 Methods

We first look at the share of respondents in all 88 countries who agreed or agreed strongly, with the statement “My home environment enables me to work productively”. Next, using a linear probability model, individual satisfaction is regressed on country, socio-demographic factors (gender, age group, time with company), type of work setting, presence of others, as well as dissatisfaction with access to IT devices and tools; access to software applications/programs; chair; and desk or table. More precisely, the outcome variable is modelled as a dummy variable that takes the value 1 if the respondent agreed or agreed strongly with the statement in focus and 0 otherwise. The regressors are mostly straightforward dummy variables corresponding to the group division in the original data set. However, the regressor “dissatisfied with access to IT devices and tools” is constructed as a dummy variable that take the value 1 if the respondent disagreed slightly, disagreed, or disagreed strongly with the statement “I have access to all of the IT devices and tools I need to work from home” and 0 otherwise. The regressor “dissatisfied with access to IT devices and tools” is constructed

analogously. Also, the regressor "dissatisfied with chair" is constructed as dummy variable that take the value 1 if the respondent was dissatisfied or highly dissatisfied with their chair at home, or if no chair was available, and 0 otherwise. The degree of satisfaction with chair is further only reported by those respondents who first indicated that chair was an important feature when WFH. Therefore, another dummy variable, "chair not important" is created that take the value 1 if the respondent did not consider chair an important feature and 0 otherwise. The regressors "dissatisfied with desk or table" and "desk or table not important" are constructed analogously.

Regressions are first run using the full data sets, i.e. with data from 88 countries. To study differences across countries, we also run separate regressions for each country with over 410 respondents. To be in line with previous single country regression studies, we want to only include countries with several hundred respondents [e.g. Alfano *et al.* (2023) (796 workers in Italy); Awada *et al.* (2021); Xiao *et al.* (2021) (988 workers mostly in the USA); and Niebuhr *et al.* (2022) (519 workers in Germany)]. While on the lower side compared to previous studies, a cutoff of 410 allows us to include countries from all continents, in total 40 countries. Including more countries would have necessitated lowering the cutoff to 329 respondents, which we think is too few, considering that the country-wise regressions include 39 explanatory variables. Among the 40 countries with at least 410 observations, the mean number of respondents is 3,290.5. Kenya has the lowest number of respondents (410) and the UK the highest (33,918).

4. Results

4.1 Global data set

Almost 70% of the respondents in the 88 countries agreed or agreed strongly with the statement "My home environment enables me to work productively". Table 1 presents the results from regressions where the outcome variable is satisfaction with productivity. The first column presents the results from univariate regressions, the second column presents the results from a multivariate regression without country dummies and the third column the results when country dummies are added. Finally, the fourth column presents the results when interactions between gender and presence of others are also added.

Comparing the point estimates from the univariate regressions with those from the simplest multivariate regression (i.e. comparing column 1 and column 2 in Table 1), it can be seen that the point estimates from the univariate and the simplest multivariate regressions tend to have the same sign, and that the point estimates that are statistically significant at least at the 5% significance level in the univariate regressions tend to be so also in the simplest multivariate regression. The point estimates from the simplest multivariate regression, however, tend to have smaller absolute values than those from the univariate regressions. However, there are some exceptions. The point estimates on the "time with company" variables are negative and statistically significant at least at the 5% significance level in the univariate regressions, indicating that having been a shorter time than 12 years with the company decreases the probability to be satisfied with productivity, whereas in the simplest multivariate regression they are positive, closer to zero and not statistically significant at least at the 5% significance level, indicating that time with company has no effect on the probability to be satisfied with productivity. A possible explanation is that the time with company variables in the univariate regressions also capture some of the age effect, i.e. if younger people tend to have been a shorter time with the company and tend to be less satisfied with productivity, some of this negative effect will be captured by the time with company variables in the univariate regressions. Related to this, the point estimates on the variables "age up to 24 years", "age 25–34 years" and "female" have a larger absolute

Table 1. Regression results probability to be satisfied with productivity when WFH

Factors	1	2	3	4
Age group (ref:35–44)				
24 years	−0.087*** [−0.109, −0.064]	−0.101*** [−0.119, −0.082]	−0.104*** [−0.120, −0.088]	−0.104*** [−0.121, −0.088]
25–34 years	−0.027*** [−0.041, −0.013]	−0.034*** [−0.050, −0.017]	−0.037*** [−0.050, −0.024]	−0.037*** [−0.050, −0.023]
45–54 years	0.049*** [0.027, 0.070]	0.030* [0.007, 0.052]	0.031** [0.010, 0.052]	0.031** [0.010, 0.052]
55–64 years	0.080*** [0.051, 0.110]	0.033** [0.010, 0.057]	0.032** [0.010, 0.053]	0.032** [0.010, 0.053]
65 years or over	0.106*** [0.055, 0.157]	0.041* [0.006, 0.076]	0.039** [0.011, 0.068]	0.039** [0.010, 0.067]
Prefer not to say	0.126*** [0.072, 0.179]	0.091*** [0.038, 0.144]	0.084** [0.023, 0.145]	0.082* [0.020, 0.145]
Time with company (ref: over 12 years)				
0 –6 months	−0.039** [−0.065, −0.013]	0.001 [−0.024, 0.027]	0.009 [−0.010, 0.028]	0.009 [−0.010, 0.028]
6–18 months	−0.035** [−0.062, −0.009]	0.007 [−0.019, 0.034]	0.016 [−0.004, 0.037]	0.016 [−0.005, 0.036]
18 months to three years	−0.043** [−0.074, −0.011]	0.001 [−0.028, 0.031]	0.011 [−0.013, 0.035]	0.010 [−0.014, 0.034]
3 –8 years	−0.035* [−0.069, −0.001]	0.004 [−0.024, 0.031]	0.009 [−0.014, 0.032]	0.009 [−0.014, 0.032]
8–12 years	−0.027* [−0.047, −0.007]	0.005 [−0.010, 0.020]	0.007 [−0.004, 0.018]	0.007 [−0.004, 0.018]
Gender (ref: Male)				
Female	0.026* [0.004, 0.048]	0.030*** [0.013, 0.047]	0.035*** [0.021, 0.048]	0.048*** [0.038, 0.059]
Non-binary	−0.032 [−0.112, 0.048]	0.004 [−0.036, 0.043]	0.010 [−0.027, 0.046]	0.026 [−0.044, 0.095]
Prefer not to say	−0.032** [−0.052, −0.012]	0.004 [−0.009, 0.016]	0.015* [0.002, 0.029]	0.034* [0.004, 0.063]
Usually present				
One or more children or dependents	−0.095*** [−0.111, −0.080]	−0.080*** [−0.097, −0.063]	−0.082*** [−0.098, −0.066]	−0.075*** [−0.091, −0.058]
A partner or other family member(s)	−0.054*** [−0.075, −0.034]	−0.031*** [−0.042, −0.021]	−0.034*** [−0.047, −0.022]	−0.030*** [−0.045, −0.015]
Friend(s) or flatmate(s)	−0.204*** [−0.246, −0.163]	−0.116*** [−0.141, −0.091]	−0.122*** [−0.144, −0.100]	−0.103*** [−0.128, −0.078]
Other person(s)	−0.198*** [−0.248, −0.149]	−0.101*** [−0.131, −0.070]	−0.103*** [−0.132, −0.073]	−0.107*** [−0.133, −0.081]
Female # one or more children or dependents				−0.018* [−0.034, −0.003]
Non-binary # one or more children or dependents				0.102* [0.021, 0.183]
Prefer not to say # one or more children or dependents				−0.015 [−0.059, 0.029]
Female # a partner or other family member(s)				−0.010* [−0.018, −0.002]
Non-binary # a partner or other family member(s)				−0.040 [−0.150, 0.071]

(*continued*)

Table 1. Continued

Factors	1	2	3	4
Prefer not to say # a partner or other family member(s)				−0.021 [−0.049, 0.007]
Female # friend(s) or flatmate(s)				−0.039** [−0.066, −0.013]
Non-binary # friend(s) or flatmate(s)				−0.067 [−0.155, 0.021]
Prefer not to say # friend(s) or flatmate(s)				−0.060 [−0.148, 0.028]
Female # other person(s)				0.005 [−0.023, 0.033]
Non-binary # other person(s)				0.012 [−0.494, 0.518]
Prefer not to say # other person(s)				0.067 [−0.002, 0.137]
Type of work setting (ref: a dedicated work room or office)				
Dedicated area	−0.127*** [−0.137, −0.117]	−0.087*** [−0.094, −0.079]	−0.084*** [−0.092, −0.076]	−0.084*** [−0.092, −0.076]
Non-work specific location	−0.313*** [−0.330, −0.295]	−0.185*** [−0.197, −0.173]	−0.179*** [−0.189, −0.168]	−0.179*** [−0.189, −0.168]
Other	−0.325*** [−0.353, −0.296]	−0.177*** [−0.196, −0.159]	−0.179*** [−0.198, −0.160]	−0.179*** [−0.198, −0.160]
Dissatisfied with access to IT devices and tools	−0.357*** [−0.372, −0.342]	−0.208*** [−0.222, −0.193]	−0.204*** [−0.217, −0.191]	−0.204*** [−0.217, −0.191]
Dissatisfied with access to software applications/ programs	−0.364*** [−0.402, −0.326]	−0.155*** [−0.177, −0.134]	−0.150*** [−0.171, −0.129]	−0.150*** [−0.171, −0.129]
Chair (ref: neutral or more)				
Dissatisfied	−0.313*** [−0.330, −0.295]	−0.105*** [−0.119, −0.092]	−0.105*** [−0.115, −0.094]	−0.105*** [−0.115, −0.095]
Not important	−0.076*** [−0.102, −0.051]	−0.023 [−0.051, 0.004]	−0.008 [−0.028, 0.011]	−0.008 [−0.028, 0.012]
Desk or table (ref: neutral or more)				
Dissatisfied	−0.400*** [−0.437, −0.362]	−0.208*** [−0.241, −0.174]	−0.203*** [−0.234, −0.172]	−0.203*** [−0.234, −0.172]
Not important	−0.082*** [−0.109, −0.055]	−0.030* [−0.058, −0.002]	−0.026 [−0.055, 0.003]	−0.026 [−0.055, 0.003]
Country dummies (ref: the USA)		No	Yes	Yes
Constant		0.921*** [0.893, 0.950]	0.930*** [0.909, 0.951]	0.923*** [0.900, 0.947]
Observations		137,446	137,446	137,446
R-squared		0.210	0.223	0.223

Notes: Standard errors clustered on countries. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
Source: Authors' own work

value in the simplest multivariate regression than in the univariate regressions. Furthermore, the point estimate on the variables "prefer not to say gender" and "chair not important" are negative and statistically significant at the 1% and the 0,1% level, respectively in the univariate regression but positive, closer to zero and not statistically significant at least at the 5% significance level in the simplest multivariate regression.

Comparing the results from the multivariate regressions with and without country dummies (i.e. comparing column 2 and column 3 in Table 1), the results are very similar, both with respect to the size and sign of the point estimates and with respect to their statistical significance. The point estimates on the variable "prefer not to say gender" is an exception: in the multivariate regression without country dummies (column 2 in Table 1), the point estimate is close to zero and not statistically significant at least at the 5% significance level but adding country dummies to the regression, the absolute value of the point estimate becomes larger and statistically significant at the 5% significance level. The opposite is the case for the variable "desk or table not important". To save on space, the country dummies can be found as an online attachment, it can however be noted that the point estimates on the country dummies are in many cases rather different between the univariate and the multivariate regressions. It can also be noted that despite controlling for the other variables, the absolute values of many of the point estimates on the country dummies are still rather large, ranging from about −0.27 for South Korea to 0.17 for Gambia, and mostly statistically significant at the 0.1% significance level. This indicates that the probability to be satisfied with productivity when WFH is about 27% points lower for a person in South Korea, as compared to a similar person in a similar home environment in the USA.

Adding interactions between gender and presence of others to the multivariate regression (i.e. comparing column 3 and column 4 in Table 1) has very little effect on most of the point estimates and their statistical significance. The absolute values of the point estimates on the variable "female" and "prefer not to say gender" however become larger, whereas the absolute values of three of the four point estimates on the variables related to presence of others become smaller.

Interpreting the multivariate regression with satisfaction with productivity as outcome variable (i.e. columns 2–4 in Table 1) it seems that being older increases the probability to be satisfied with productivity when WFH: the point estimates for the youngest age groups are negative and significant at the 0.1% significance level while the point estimates for the older age groups are positive and statistically significant at least at the 5% significance level. Compared to those 35–44 years old, being in the youngest age group decreases the probability to be satisfied by about 10 percentage points, whereas being in the oldest age group increases the probability to be satisfied by about 4 percentage points. Time with company, on the contrary, do not seem to affect the probability to be satisfied with productivity when WFH: all point estimates related to the time with company variables are small with low statistical significance. Being a woman seems to increase the probability to be satisfied with productivity when WFH by about 3–5 percentage points statistically significant at the 0.1% significance level. Having someone present at home seems to decrease the probability to be satisfied; about 8 percentage points if the person(s) at home is one or more children or dependents; about 3 percentage points if it is a partner or other family member(s); about 10–12 percentage points if it is friend(s) or flatmate(s) and about 10–11 percentage points if it is yet another person, all statistically significant at the 0.1% significance level. It also seems that the decrease associated with the presence of others is stronger for women than for men: the point estimates on the interactions between the variable "female" and the variables "one or more children or dependents", "a partner or other family member(s)" and "friend(s) or flatmate(s)" are negative and statistically significant at least at the 5%

significance level. The physical setting further seems to have a strong association with probability to be satisfied with productivity. As compared to working in a dedicated room or office, working in a dedicated area is associated with a decrease in probability to be to be satisfied by about 8–9 percentage points, statistically significant at the 0.1% level, and the decrease is even larger, and as statistically significant, if working at a "non-work-specific home location" or "other location": the point estimates indicate that working in a "non-work-specific location" or "other location" decrease the probability to be satisfied by about 18–19 percentage points. The decreases in probability to be satisfied associated with dissatisfaction with access to IT devices and tools, access to software applications/programmes, chair or desk or table, are also large and statistically significant at 0.1% significance level. In particular, being "dissatisfied with access to IT devices and tools" or "dissatisfied with desk or table" is associated with a decrease in the probability to be satisfied with productivity when WFH of about 20 percentage points.

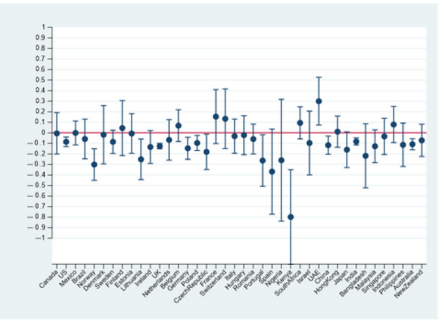
Finally, it can be noted that the multivariate regressions reported in columns 2–4 in Table 1 explains about a fifth of the variation in probability to be satisfied with productivity when WFH. The *R*-squared is 0.210 in the multivariate regression without country dummies (column 2 in Table 1) and 223 in the multivariate regressions with country dummies (columns 3 and 4 in Table 1).

4.2 Productivity by country

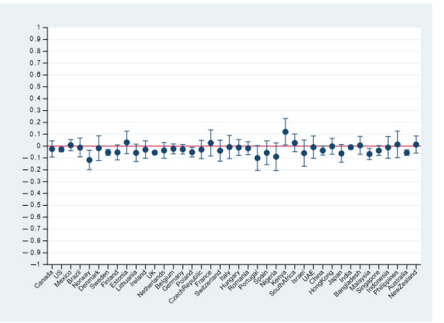
We have run our richest multivariate regressions for each of the 40 countries with at least 410 observations (without country dummies and with robust standard errors). For the variables that are statistically significant at least at the 5% level in the richest multivariate regressions pooling data from 88 countries (i.e. in column 4 in Table 1), the different panels of Figures 1–3 graphically show the point estimates along with the 95% confidence intervals for each of the 40 countries [5]. In the panels, the countries have been ordered by continent, and within the continents approximately in strokes from west to east, starting from the northernmost country, to see if countries that are geographically close have similar estimated variable coefficients. It should be noted that running separate regressions for each country, we estimate many point estimates. Therefore, we cannot rule out that some of them will, by chance, turn out to be falsely significant.

Related to age, we find that for most countries, although not always statistically significant at the 5% significance level, the point estimates tend to be negative for age groups younger than 35–44 years and positive for the older age groups (cf Figure 1, panel a–e), indicating that, if anything, being younger decreased the probability to be satisfied with productivity while WFH. Two countries, United Arab Emirates and Kenya, stand out with statistically significant positive point estimates on one of the younger age groups, whereas five countries, Switzerland, India, France, Japan and Philippines, stand out with statistically significant negative point estimates on one of the older age groups.

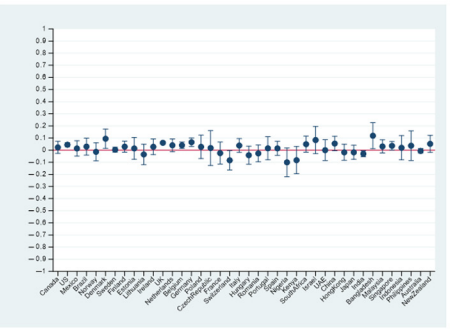
Furthermore, although again not always statistically significant at least at the 5% significance level, the point estimates on the variable "female" are positive for most countries (cf Figure 2, panel a), indicating that, if anything, being a women increased the probability to be satisfied with productivity while WFH. Kenya is again an exception with a negative and statistically significant point estimate on the variable "female". A negative association between presence of others at home and the probability to be satisfied with productivity when WFH is apparent in most countries, although not always statistically significant at least at the 5% significance level (cf Figure 2, panel b–e). Norway stands out with a statistically significant positive point estimate on presence of "other person(s)". However, while the regression pooling 88 countries indicated that the decrease in probability



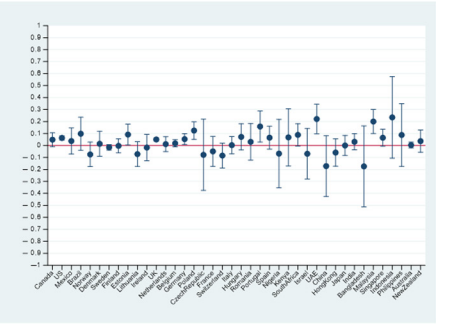
(a)



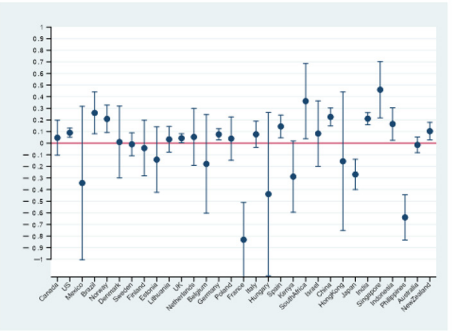
(b)



(c)



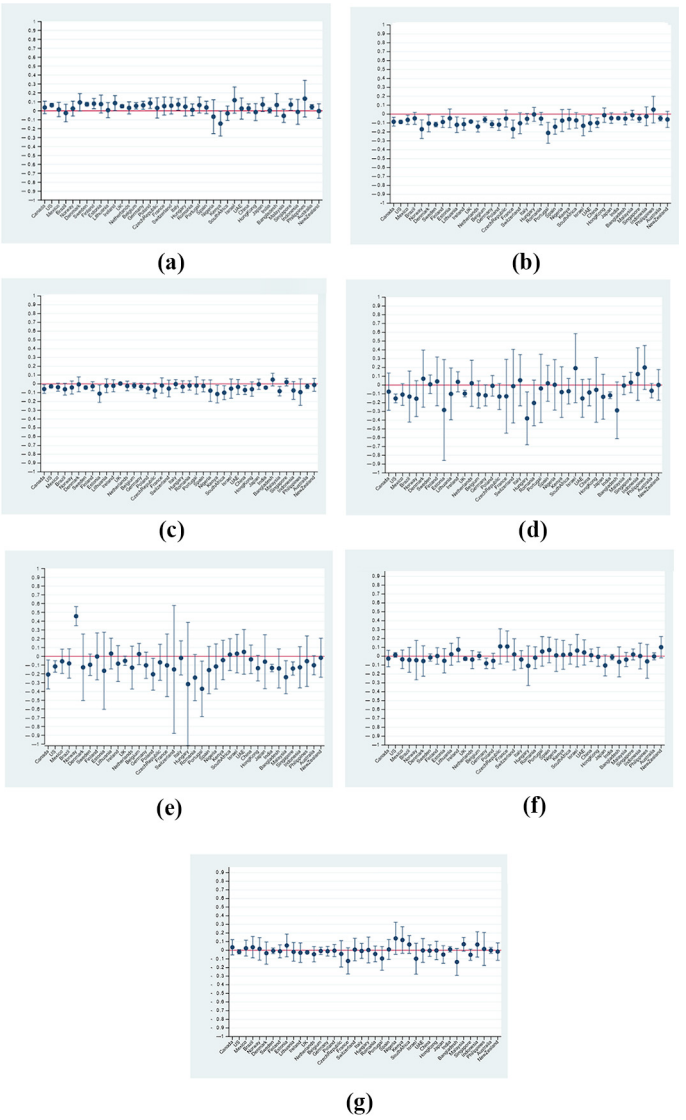
(d)



(e)

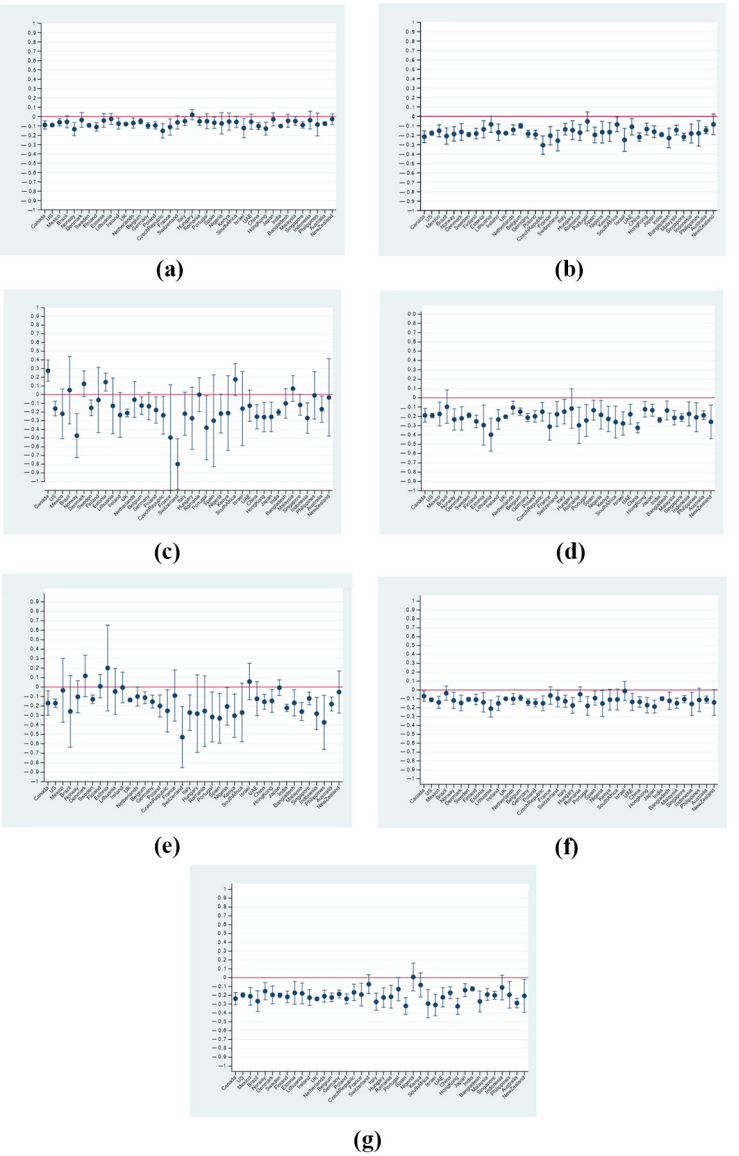
Notes: (a) Productivity: age 24; (b) productivity: age 25–34; (c) productivity: age 45–54; (d) productivity: age 55–64; (e) productivity: age 65 or more
Source: Authors' own work

Figure 1. Productivity and age



Notes: (a) Productivity = female; (b) productivity = children or other dependents; (c) productivity = partner or other family member; (d) productivity = friends or flatmates; (e) productivity = other persons; (f) productivity = female with children or dependents; (g) productivity = female with partner or family members
Source: Authors' own work

Figure 2. Productivity, gender and the presence of others



Notes: (a) Productivity = dedicated area; (b) productivity = non-work-specific location; (c) productivity = other area; (d) productivity = dissatisfied with devices and tools; (e) productivity = dissatisfied with software or programs; (f) productivity = chair dissatisfied; (g) productivity = desk or table dissatisfied

Source: Authors' own work

Figure 3. Productivity and physical setting

to be satisfied with productivity when WFH associated with the presence of others is stronger for women than for men (cf column 4 in Table 1), the country-wise regressions show a more disperse picture (cf Figure 2, panel f–g). A negative point estimate on the interaction between "female" and presence of "one or more children or dependents" is only found in about half of the countries and is only statistically significant for two of these. A negative point estimate on the interaction between "female" and "a partner or other family member(s)" is found in a few more countries but is only statistically significant for one country.

The negative associations between different aspects of the physical setting and the probability to be satisfied with productivity when WFH found in the regressions pooling 88 countries, is apparent in almost all countries (cf Figure 3, panel a–g). Canada and Estonia however stand out with a statistically significant positive point estimate on the variable "other area". A last thing that can be noted from Figures 1–3 is that there is no visually apparent geographic pattern in the variable coefficients. The point estimates on a given variable for countries within the same continent, or even neighbouring countries, seem no more similar than the point estimates for countries further from each another.

5. Discussion

This study set out to establish how employees around the world experienced productivity when WFH during the COVID-19 pandemic. Using a data set of almost 137,500 respondents from 88 countries, we find that most respondents felt productive when WFH. Our results suggest that gender, age, presence of others and the physical setting at home affect the perception of productivity while WFH. In most countries, being younger seems to decrease the probability to be satisfied with productivity when WFH, whereas being female seems to increase the probability of satisfaction. The presence of others at home seems to decrease the probability to be satisfied with productivity in most countries, although there are some exceptions. The results also suggest that women are more likely to be negatively impacted by the presence of others, although in the country-wise regressions, the negative association is rarely statistically significant. Furthermore, dissatisfaction with the physical aspects of the WFH setting seems to decrease the probability of being satisfied with productivity in almost all countries. This indicates that by supporting the material work setting at home, satisfaction in WFH could be enhanced.

A significant limitation in the data that we have available is that it does not include information about the nature of the respondents' education, income and work tasks, other than that they are knowledge workers. Based on previous knowledge, certain work tasks are more suitable for WFH, typically, administrative tasks requiring less face-to-face interaction (e.g. Kojo and Nenonen, 2015). Appel-Meulenbroek *et al.* (2022) suggest that WFH may be more suitable for women and entry-level employees due to their involvement in administrative tasks. According to the univariate regressions in this study, employees that had been a shorter time with a company had a lower probability to be satisfied with their productivity while WFH than employees that had been with the company longer. However, controlling for other variables such as age, we find no effect of time with company on the probability of satisfaction.

Another limitation is that the data does not provide information about the micro location of the respondent. For example, different aspects of the home surroundings and distance to the ordinary workplace might impact the WFH experience. We are further missing information about residential characteristics apart from the type of work setting. As for the social setting, we have information about presence at home when WFH, but the overall family situation might also affect the WFH experience. Differentiating between children and other dependents might also have provided further insight. The missing information may

give rise to unobserved variable bias, which challenges the causal interpretation of our results. Finally, it should be noted that even though COVID-19 provides a unique setting for studying variables like the presence of others at home, it represents an extreme situation, which does not necessarily reflect the typical WFH setting.

Despite the aforementioned limitations, our results highlight the impact of demographic characteristics as well as social and physical settings at home. Our main contribution is two-fold. First, our study provides novel insights into several countries that have not been studied before. These include, first and foremost, countries in the global South, which typically receive less attention in workplace research. Our results build a general understanding around the topic of WFH on a truly global scale. Second, our results can be used to validify some of the prior findings that have been made with smaller samples of individual countries or organizations. In line with previous studies, we find that being a woman (e.g. Appel-Meulenbroek *et al*. 2022), having no one present while working (e.g. Awada *et al*., 2021) and having a dedicated room (e.g. Bergefurt *et al*., 2022) all seem to support WFH.

Our findings are useful for employers developing their workplace management strategies, as well as employees aiming towards productivity and work–life balance. In this new era of working, workplace management strategies need to be reinvented. Organizations have traditionally steered their workplace decisions with a top-down approach and without profound understanding of the employees' needs (Tagliaro and Migliore, 2021). Awada *et al.* (2021) and Khalid *et al.* (2023) call after practical applications and organizational practices and policies to acknowledge the variety of WFH settings and their impact on health and well-being, performance and engagement. WFH deserves attention from employers and employees alike. WFH should not be considered as an identical continuation of traditional office-based work but a novel field, with distinct methods and knowledgebase. The future of WFH relies on well-planned and executed collaboration between employers and employees.

6. Conclusions

On a global scale, most employees WFH are satisfied with their productivity. Differences between countries exist when controlling for socio-demographic factors, presence of others and physical setting at home. However, no clear geographical patterns could be observed, and further studies to understand the geographical differences are needed. Furthermore, age, gender, presence at home and the physical setting all seem to play a role in the WFH experience. Therefore, employers should understand their workforce and individual preferences, but also pay attention to the physical aspects supporting WFH including for example space arrangements that decrease distractions at home or support heathy work–life balance. Physical aspects also include suitable ergonomic office furniture and functional IT devices. We highlight the need for further studies on different WFH support mechanisms, including different physical settings, such as co-working spaces, and case studies on successful collaboration between employees and employers.

Notes

1. Australia, China, Egypt, France, Germany, Greece, Hungary, the Netherlands, Poland, Serbia, Sweden, Turkey, the UK, Ukraine and the USA.
2. The countries enumerated under footnote 1, except Egypt and Serbia, plus Austria, Brazil, Canada, India, Italy, Japan, South Korea, Malaysia, Russia, Singapore, Spain and Taiwan.
3. The metropolitan areas are in Belgium, France, Israel, Italy, Norway, Spain, Switzerland, the UK and the USA.

4. However, the study only enumerates 23 countries: Austria, Bangladesh, Denmark, Finland, France, Germany, India, Iran Italy, Malaysia, Malta, Norway, Philippines, Portugal, Saudi Arabia, Singapore, South Korea, Sweden, Switzerland, the Netherlands, the UK, Tunisia and Turkey.
5. However, we do not show graphically the point estimates the variables "prefer not to say age group" and "prefer not to say gender", although they are statistically significant at the 5% significance level in column 4 in Table 1. Because there can be many motivations for choosing these answers, it is unclear what they represent.

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Supplementary material

The supplementary material for this article can be found online.

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