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Psychosocial job characteristics comparison between work from home and work in the office: a study from the pandemic onwards

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Introduction: The Covid-19 pandemic changed office workers' work situation through the widespread use of the working from home (WFH) model. It also changed the demands for, and the resources allocated to, the same tasks depending on the location of their execution. The aim of this study was to identify potential differences in the level of theoretically established job stressors between WFH and regular office work, especially with respect to working parents with childcare responsibilities.

Method: We tested the relevant working conditions by conducting repeated online surveys with three measurement times between 2020 and 2022 ($N = 1,144$ in total).

Results: Paired sample *t*-tests for each measurement time showed significant differences between WFH and work in the office for six out of seven psychosocial risk factors (e.g., social relationships with supervisors and colleagues). Only work intensity did not differ between WFH and work in the office. The specific challenges for WFH parents caring for children were revealed in a decreased work continuity compared to employees without childcare responsibilities. Our results suggest that job stressors are contingent on the place of work.

Discussion: In conclusion, while WFH affords the opportunity to counterbalance job stressors in the long term, it requires the support of social relationships, especially for full-time WFH employees. Parents with childcare responsibilities require assistance in addressing their individual needs amidst the challenges of WFH.

KEYWORDS

working from home (WFH), COVID-19 pandemic, job characteristics, psychosocial risk factors, childcare, hybrid work

Introduction

The COVID-19 pandemic posed significant challenges to society at the beginning of the 2020's. The first short-term lockdown in the spring of 2020 forced many workers to reduce their working hours, while office workers were often able to take their work home within a short period of time. In Germany, in particular, the percentage of people working from home (WFH) rose from 13 to 21% in 2020 and to 25% in 2021 (Statistisches Bundesamt, 2022), with the trend suggesting that, for the long term, many employees would prefer a hybrid model in which the office and home alternate as the workplace (Bruch, 2022).

In the context of widespread remote work, which is typically digital and location-independent, this study examines the psychosocial risk factors among office workers across various industries. It focuses particularly on the transition to hybrid work models, where employees alternate between office and home settings. Consistent with the findings of the ESENER-3 report (Irastorza, 2019), 24% of EU companies have been found not to undertake mandatory analyses of psychosocial risks, a trend that persists despite significant pandemic-triggered shifts toward remote work.

While previous research has addressed specific risk factors, there is a gap in comprehensive comparisons between office and home workplaces, particularly within the framework of a psychosocial risk assessment (PRA). While pre-pandemic studies often contrasted telecommuters with non-telecommuters, the current landscape reflects fluid transitions between office and home workspaces. Therefore, drawing on the Job Demands-Resources Model (JD-R, Demerouti et al., 2001), this study aims to compare psychosocial hazards within individuals across different work environments. By analyzing data from the pandemic years 2020–2022, we seek to identify potential differences in job characteristics between office and home settings, offering practical and theoretical insights for future work organization and psychological strain mitigation. Additionally, this study extends research (Pousette and Hanse, 2002) that has focused on how variations in the mean values of demands or resources can lead to different associations within generic job stress models.

Literature

To understand the distinctive challenges of the hybrid work model, it is imperative to explore the specific conditions relevant to the model and the most recent findings on the subject. It should be clarified at the outset that this investigation focuses primarily on work from home, which is not legally regulated. In contrast, teleworking is legally protected by the framework agreement of telework in the EU (European Trade Union Confederation (ETUC) et al., 2002) and was established in a few enterprises prior to the pandemic.

Psychosocial risk factors and working from home

Before the pandemic, WFH was possible only for a few employees. For instance, López-Igual and Rodríguez-Modroño (2020) observed a higher incidence of telework permissions among male managers. While the nature of the relevant tasks was often cited as a reason, the quality of trust in the employee-manager relationship and performance was particularly decisive (Beham et al., 2015). Studies prior to 2020 have consistently shown several positive outcomes associated with remote work arrangements. Employees working remotely reported higher levels of commitment, flexibility, and decision latitude (Paridon and Hupke, 2009; Biron and Van Veldhoven, 2016). Additionally, telework was associated with increased job satisfaction, effectively mitigating negative job demands and contributing to the overall wellbeing (Tavares, 2017). Moreover, telework arrangements were found to have positive impacts on individual health, promoting a better work-life balance and reducing stress levels (Tavares, 2017).

Despite its advantages, remote work also presents certain challenges and drawbacks. One of which is that remote workers frequently encounter interruptions and work-family conflicts, affecting their overall job performance and wellbeing (Fonner and Roloff, 2012; Eddleston and Mulki, 2017). Additionally, telework may lead to reduced opportunities for career advancement and blurred boundaries between work and personal life, making it difficult for employees to manage their time effectively and maintain work-life balance (Tavares, 2017). When compared with the hybrid work models that are currently being implemented, these pre-pandemic studies exhibit two noteworthy shortcomings. Generally, these studies compared the data of people who were able to work from home with others working in the office. Additionally, previous research had already examined the specific job-related stress of remote workers, or teleworkers. There is a paucity of research involving the general assessment of the psychological risk of remote work prior to the pandemic. During the pandemic, many workers were forced to work from home, leading to new studies focusing on the unique challenges of WFH during this period. The short-term changes suddenly brought about by the lockdowns posed great challenges to many employees as they were not accustomed to those changes. For many, WFH proved particularly difficult owing to the lack of equipment, performance-related limitations, and lower social support from colleagues and managers (Ipsen et al., 2021; Lee, 2021). These factors coupled with a lack of organizational support can lead to reduced wellbeing and productivity among workers (Ipsen et al., 2021; Becerra-Astudillo et al., 2022; Mihalache and Mihalache, 2022).

During the lockdowns, the paucity of social exchange due to contact restrictions in leisure time resulted in many WFH workers feeling lonely (Killgore et al., 2020). The absence of any opportunity for spontaneous conversations with colleagues proved an added disadvantage (Waizenegger et al., 2020). In addition, there was fear of contagion, uncertainty of the future, and further consequences of the pandemic (Dragano et al., 2021). These limitations resulted in increased stress levels professionally and personally (Hayes et al., 2020; Casjens et al., 2022).

However, as overwhelming as the challenges were due to the sudden switch to WFH, there were also opportunities for improved workplace characteristics. For one, the lack of on-site colleagues could potentially lead to more efficient work and the ability to more freely allocate one's time and tasks. Furthermore, with the elimination of additional trips to the office, work-life balance was strengthened, and many workers felt more comfortable at home (Abdullah et al., 2020; Aczel et al., 2021; Barrero et al., 2021; Ipsen et al., 2021).

The diverse conditions highlighted before and during the COVID-19 pandemic are reflected in recent literature. In their review, Antunes et al. (2023) have provided a summary of the psychosocial risk factors, dividing them into seven categories following the framework of Gollac and Bodier (2011). Recent studies during the pandemic have indicated that four of the factors, namely reduced work intensity and working hours,

social relationships, and fear of job insecurity, decrease in full-time telecommuting. Simultaneously, noticeable increments have been seen in emotional demands and the home/work interface, indicating a blending of the workplace with private life. According to the review, the seventh factor, conflict of values, was not examined closely. Also, as the review focused on psychosocial risks in full- and part-time WFH employees, it is not known how the risk factors affected the same (part-time tele-workers) depending on their job location during and after the pandemic. With these aspects in mind, the present study seeks to shed light on the relevant impact of these factors over the course of three consecutive years between 2020 and the end of the lockdowns.

Job Demands-Resources model

Since the pandemic, several studies have explored the theoretical models of various job characteristics of WFH, like the particularly well-known Job Demands-Resources (JD-R) model (e.g., Barbieri et al., 2021; Demerouti and Bakker, 2023; Kruyen et al., 2023), which involves the linking of workplace factors strain and motivation, and the resultant organizational outcomes.

The JD-R model illustrates the relationship between positive (resources) and negative (demands) work characteristics and their impact on occupational health (e.g., strain outcomes) and wellbeing (e.g., motivation). Demands are identified as negatively valued job characteristics that result from organizational or social factors requiring sustained mental effort, such as emotionally challenging interactions with clients or high levels of work pressure (Bakker and Demerouti, 2007). Resources, on the other hand, are characterized by factors that are positively valued, such as autonomy or helpful feedback (Bakker and Demerouti, 2007). Acting as promoters or obstructors of work activities, demands, and resources can thus determine the productivity and wellbeing of employees (Bakker and Demerouti, 2007). Past research has suggested various adjustments to evaluate the applicability of the JD-R model to emerging work paradigms. For instance, Kruyen et al. (2023) has expanded the model to include personal and home demands/resources in the WFH context, advocating for the clustering of individual demands and resources. In a similar vein, Barbieri et al. (2021) have proposed subdividing resources into organizational and individual aspects, akin to the personal factors discussed by Kruyen et al. (2023). Adding to this discourse, Demerouti and Bakker (2023) have highlighted the intricate interplay between job demands, organizational resources, and individual wellbeing during crises like the COVID-19 pandemic, enriching our understanding of the implications of remote work. Their insights contribute to the ongoing exploration of novel work paradigms, underscoring the need for adaptable frameworks to effectively address the evolving workplace dynamics.

Conventional studies involving WFH have often evaluated conditions exclusively at home or within office settings, utilizing separate cohorts. Our distinctive sample, on the other hand, enabled individuals to directly contrast their experiences in the two settings, uncovering the specific nuances of each. This methodology facilitates the identification of unique resources and demands associated with the office or the home environment. Building on past research on psychosocial risk assessment at work in general, and WFH in particular, the present study aims at analyzing relevant differences in psychosocial working conditions at home and in the office within the predictor structure of the JD-R model. Considering the review of Antunes et al. (2023), the key factors of this examination are the emotional, social, and organizational conditions, which can act as either resources or demands in the context of the JD-R model. These factors can be seamlessly integrated into the existing German occupational safety Guidelines for Psychosocial Risk Assessment at work (Beck et al., 2014).

Hypotheses

In the present study, we focus on emotional demands at the workplace as an emotional condition (see Antunes et al., 2023) according to the usual procedure in PRA. Prior studies have documented a pre-pandemic reduction in emotional demands while working from home, and an increase during the pandemic lockdown phases (see Antunes et al., 2023). However, increased emotional demands in WFH during the pandemic may have been uniquely related to concerns about infections and the pandemic's progression. In this study, the focus is on emotional demands intrinsic to job tasks, such as direct interaction with clients or customers. Consequently, with less customer contact/public interaction in WFH compared to the office, these demands are expected to be lower, leading to the first hypothesis:

Hypothesis 1: The emotional demands of the job are lower in all 3 years when working from home compared to working in the office.

As mentioned earlier, social conditions, measured here as social relationships and support, fundamentally differ between the office and home. In the office, spontaneous interactions often occur during daily commutes, fostering immediate exchange. Conversely, in the home office, deliberate efforts are required to connect with colleagues and supervisors. Various studies (Ipsen et al., 2021; Lee, 2021; Becerra-Astudillo et al., 2022; Kruyen et al., 2023) have highlighted a reduction in social resources and support during WFH. However, these studies have often compared telecommuters with office-based workers, or have linked telecommuters' experiences with only specific outcomes, thus lacking a direct comparison between participants' home and office workplaces. This leads to the following hypothesis:

Hypothesis 2: Social resources are lower when working from home compared to working in the office in all 3 study years.

The third area under consideration is organizational conditions, which can be divided into different subcategories according to the usual procedure for PRA. According to the procedure used here, these conditions include the following four factors: work intensity as a demand, and job resources like job autonomy, work continuity and task clarity. Autonomy, as per the JD-R model, is linked to increased work motivation (Demerouti et al., 2001) and is perceived to be higher in the home office due to greater opportunities to control the process involving particular tasks (Ipsen et al., 2021). Work continuity may also be better in the home office due to fewer interruptions (e.g., Abdullah et al., 2020). However, previous studies on work intensity contradict each other, with some showing a reduction in work intensity (review of

Antunes et al., 2023) and others an increase (Rebelo et al., 2024). The change in task clarity is also unclear owing to a paucity of knowledge in this respect. However, from the lack of in-person exchange and altered digital organizational structures, it can be inferred that WFH can have a negative effect (Ipsen et al., 2021; Rodríguez-Modroño and López-Igual, 2021). Existing reviews (Beckel and Fisher, 2022; Antunes et al., 2023) and studies (e.g., Ipsen et al., 2021; Kruyen et al., 2023) offer divergent results on the organizational factor. Therefore, our third hypothesis remains non-directional considering the difference in psychosocial working conditions between the office and home:

Hypothesis 3: Organizational factors, involving work intensity, job autonomy, work continuity and task clarity, differ in all 3 years between working from home and working in the office.

In addition to the three hypotheses, the present study includes three exploratory research questions. Following the initial short-term shift to WFH in the spring of 2020, this condition became normal for many workers as the pandemic continued. With periods of lockdown-like conditions persisting throughout 2021, hybrid work models alternating office work and WFH became established to help curb the COVID-19 contagion.

After 3 years of the pandemic's impact, it was possible to take stock of the situation with respect to WFH and draw conclusions about the pros and cons of a switch from office to WFH. Similarly, the fear of infection had been mitigated by the increase of vaccinated populations (DAK-Gesundheit, 2022). Therefore, for 2022, there should have been a more factual or generalizable consideration of job demands and psychosocial working conditions in the hybrid work models. It was possible to measure the concrete effects of WFH on occupational health and safety and thus arrive at relevant recommendations with respect to the work-related stress models. As illustrated, there are different and even contradictory findings regarding the levels of different job characteristics in WFH and working in the office (e.g., social relations with the supervisor) before and during the COVID-19 pandemic (Tavares, 2017; Ipsen et al., 2021; Lee, 2021). For example, while the relationship between remote workers and their leaders was markedly good before the pandemic, there was less contact during the pandemic, owing to the whole team working from home (Beham et al., 2015; Lee, 2021). That being said, the conditions have evolved throughout the pandemic, with the development of digital meeting and collaboration structures, and organizations increasingly adapting to digital formats, leading to work intensity becoming more established. The consideration of the diverse time points of data collection during the pandemic and lockdowns led to the following research question:

Research Question 1: In terms of psychosocial risk factors, does any habituation effect cause a reduction in the disparity between the two workplaces (WFH and office)?

The second and third exploratory questions involve the special situation of working parents, who faced particularly difficult challenges during the lockdowns because they had to take care of their children due to the closure of day-care facilities and schools. Having had to fulfill two roles, they reported higher stress levels as well as lower life satisfaction compared to those without children (Hübener et al., 2021; Calvano et al., 2022). In particular, WFH mothers who cared for their children took on more care tasks during the lockdowns than fathers (Kohlrausch and Zucco, 2020), thus reporting lower job-related productivity and even lower life as well as job satisfaction (Feng and Savani, 2020; Hübener et al., 2021). However, there were no data as to the exact workplace characteristics among WFH parents as a special group. Thus, a better understanding of the workplace risk factors may aid parental support. Following the JD-R model, increasing resources and reducing demands are fundamental conditions for higher motivation and reduced strain, which in turn can help augment organizational outcomes. Hence the following research questions:

Research Question 2: How do psychosocial risk factors differ between workers with and without childcare responsibilities?

Research Question 3: Is there a gender-based difference in the way psychosocial risk factors affect caregiving parents?

Materials and methods

Procedure

To test the hypotheses and the research questions, an online survey was conducted as a cross-sectional study for 3 consecutive years (2020, 2021, and 2022) in a within-subject design. Participants were approached in all 3 years via social media and distribution lists of various companies from different branches. To participate in the study, they had to work at least part of their working time from home. The participants were able to leave their email addresses of the 1st year for the follow-up survey in the 2nd and 3rd years. Each participant was asked to report on common workplace characteristics both at the office and while working from home. During the lockdowns, some participants were exclusively working from home at the time of survey participation, they were required, therefore, to provide answers based on their past experience in the office.

Since the initial survey did not anticipate future repetitions, overlapping participants could only be identified based on the question "Did you participate in the first survey last year?" For the second and third surveys, individual codes were provided as a pandemic-related precaution. While a massive mismatch of participant codes precluded a true longitudinal study, it was possible to determine that at least 29% from the 1st year participated in the second survey, and 18% from the 2nd year participated in the third measurement occasion. Consequently, we treated the three measurements as coming from three different samples. The study was approved by the local ethics committee (EK 23-006), and the participants provided informed consent before providing their responses.

Participants

After adjusting the sample to account for incomplete questionnaires or the absence of a WFH portion, a total of 1,144 participants (2020: 489; 2021: 497; 2022: 158) were included in the analysis. Demographic characteristics of the samples can be found in Table 1 for each year and overall. In addition, office workers came from various branches: 45.1% of respondents worked in the information sector, followed by 33.4% in the service sector, 15.3%

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TABLE 1 Sample description at all measurement points in percentage.

	T1	T2	T3	Overall
N	489	497	158	1,144
Age				
18–30	36.4	20.9	18.4	27.2
31–40	25.8	28.4	20.9	26.3
41–50	15.5	18.5	14.6	16.5
51–60	18.6	27.2	37.3	24.9
61–70	3.5	4.8	8.9	4.8
Gender				
Men	44.0	40.0	50.6	43.2
Women	55.4	57.9	48.7	55.6
Non-binary	0.2	1.0	0.6	0.6
No answer	0.2	1.0	0	0.5
Hours per week				
Full-time	76.8	68.8	69.0	72.2
Part-time > 19 h	16.8	25.6	23.4	21.5
Part-time < 19 h	6.4	5.6	7.6	6.2
Other factors				
Manager	12.1	12.5	13.9	12.5
% of WFH	85.0	76.0	52.8	76.6
Child care	19.8	15.9	8.2	16.5

T1 = 2020, T2 = 2021, T3 = 2022.

in industry, 9.6% in pharmaceuticals, and 0.9% in agriculture. While most participants were employees (94.8%), 3.4% were self-employed and 0.9% were freelancers. Out of the 190 (16.5%) participants who reported to have childcare responsibilities while working from home, 58.4% were women.

Measures

At all three measurement points, an online questionnaire was used to collect data on age and gender, branch, employment relationship, job scope, and extent of WFH involvement.

The study explicitly concentrated on evaluating job characteristics based on the broad categories of the JD-R model to determine the different frequencies of occurrence in demands and resources. Recent considerations regarding the categorization of demands and resources within the JD-R model, as proposed by Schaufeli and Taris (2014), suggest they may represent two sides of the same dimension (for example, a lack of resources could also be considered a type of demand). So, we selected a survey aimed at evaluating psychosocial job characteristics in a value-neutral manner, namely the PsyHealth questionnaire (Kuczynski et al., 2020). The categorization was grounded in the foundational principles of the JD-R model (see, for example, Nebel et al., 2010). A particularity of the survey is the condition-related and not person-related assessment of psychosocial work characteristics (Schneider et al., 2019). For all scales, participants had to respond on a four-point frequency scale (0 = "at no time some of the time" up to 3 = "most or all of the time"), indicating how often a specific workplace characteristic occurred in WFH or work in the office. This implies that participants responded to all items twice: once related to the demands and resources when WFH and once while in the office. A fifth response option was the option of "not applicable" in case the characteristic did not apply to their relevant activity. This option, however, was excluded from the calculations. The items for each respective subscale were calculated to form a mean value. For analyses, all categories, except emotional demands, were coded, so that a higher mean value classified the work characteristics as a resource and a lower mean value as a demand. Emotional demands were coded the other way round due to the negative orientation of the items and the term. A higher value therefore meant a higher demand.

Emotional demands were assessed using the 3-item subscale "emotional challenges" from the PsyHealth Instrument (Kuczynski et al., 2020). A sample item was: "Within the activity, it is necessary to strongly suppress one's own feelings."

Social resources were measured with two separate subscales with four items each representing social relationships with colleagues and the immediate supervisor. Participants had to indicate how often colleagues or supervisors showed a specific behavior during WFH and while working in the office. A sample item was: "Colleagues in this activity area support each other when necessary." A sample item related to the supervisor was: "Direct supervisors in this activity area help with problem situations as necessary."

Job autonomy as the first organizational job characteristic was measured with the decision latitude subscale consisting of three items. A sample item was: "Within the activity the content and scope of the tasks can be influenced."

Workload as the second organizational job characteristic was assessed with the "work intensity" subscale. On five items, participants had to report how often specific conditions had occurred, including the following: "Within the activity, regular recovery breaks are taken."

Work continuity was measured with the 3-item subscale, a sample item was: "Within the activity only one task is performed at a time."

As the last work characteristic, task clarity was assessed with the respective 3-item subscale. A sample item was: "Within the activity work orders are clearly defined." All subscales with their respective Cronbach's Alpha reliabilities are shown in Table 2. The values were calculated for all 3 years and for both work settings.

Statistical analyses

The data analysis was conducted using the SPSS statistical program version 29 (IBM Corp, 2022). To test the hypotheses, paired-samples *t*-tests were conducted for the individual years 2020–2022 by comparing the mean values of each job characteristic in the office and while WFH. According to the Intersection Union principle, the hypotheses are only fully accepted if all 3 years demonstrate a significant difference (All-or-None decision rule). This ensures that the risk of a Type I error does not increase,

TABLE 2 Job demands and resources with the range of Cronbach's Alpha between years and workplaces.

Subcategories	Cronbach's α	Number of items
Emotional demands	0.479–0.638	3
Social relationships with colleagues	0.764–0.822	4
Social relationship with supervisors	0.794–0.823	4
Decision latitude	0.677–0.750	3
Work intensity	0.605–0.747	5
Work continuity	0.516–0.618	3
Task clarity	0.677–0.789	3

The Cronbach's α was calculated for all three measurement times while working in the office and WFH.

rendering the adjustment of the significance level unnecessary (Berger, 1982; Neuhäuser, 2006). As hypotheses 1 and 2 are directional hypotheses, a one-tailed significance level is applied, while hypothesis 3 is tested using a two-tailed approach.

Research question 1 is presented descriptively, with the means of the years being exploratively examined solely due to the distinct sample compositions. Due to the small number of participants with parallel childcare in 2022, research questions 2 and 3 were calculated using paired-samples *t*-tests only in 2020 and 2021. According to the procedure described above, a two-tailed test was carried out for RQ 2 and 3 with no adjustment for the significance level. The work location served as the independent variable (office vs. WFH) and the job characteristics with their seven subcategories served as the dependent variables.

Results

The Pearson correlation coefficients of all study variable per year and work setting, are presented in the Supplementary material within the correlation tables (Supplementary Tables 1–6).

The hypotheses expected differences in job characteristics between WFH and working in the office. The results of the *t*-tests of each job characteristic are shown in Table 3.

Hypothesis 1 could be accepted based on the results of the *t*-tests presented in Table 3. The emotional challenges, conceptualized as demands according to the JD-R model, were consistently lower when working from home across all three assessments compared to the office setting. The effect sizes were considered modest (Cohen's *d*: 0.412–0.491; Cohen, 1992).

Hypothesis 2 could also be fully accepted as, across all three measurement points, social relationships with colleagues and supervisors were lower when working from home compared to the regular office workplace. The effect sizes were small (0.218–0.274; Cohen, 1992).

Since hypothesis 3 includes several constructs, the results are presented for each variable. With respect to decision latitude and task continuity, participants reported more decision latitude and better task continuity when working remotely compared to the office setting across all 3 years. Notably, task continuity exhibited substantial effect sizes (0.542–0.778; Cohen, 1992), while decision latitude displayed relatively smaller ones (0.122–0.236; Cohen, 1992). Work intensity yielded inconsistent results, with a significant difference for reduced workload in the office reported only in 2021. Compared to office work, the clarity of tasks in WFH was significantly lower during the first two assessments than reported in 2022. Accordingly, the effect sizes are small for work intensity (0.017–0.133; Cohen, 1992) and task clarity (0.012–0.254; Cohen, 1992). Thus, hypothesis 3 could only partially be supported for the constructs of decision latitude and task continuity.

To apply research question 1, the descriptive values of the 3 years in Table 3 are compared with each other. These showed a majority of the *t*-tests to be significant, but not uniformly and across all 3 years. Emotional demands and social relationships were significantly different depending on the work setting with a small effect size, and work continuity showed significant differences with a medium effect size (Cohen, 1992). Since this was not a longitudinal survey with the same sample, no appropriate inferential statistical procedures were applied.

Research question 2 looked at the difference in job demands between WFH participants who took care of children and those who did not. The results of the *t*-tests in 2020 and 2021 are shown in Table 4. As seen in Table 4, there were significant effects in work continuity, work intensity and emotional demands (only 2021) with a medium effect size (Cohen, 1992). WFH participants without childcare had higher values there.

Possible gender differences in job characteristics for WFH participants caring for children were collected in Table 5 to answer research question 3. As shown in Table 5, there were no significant differences in job characteristics between WFH men and women while caring for children.

Discussion

The present study surveyed the difference between WFH and working in the office in terms of the occurrence levels of common job characteristics at three measurement points. The aim of the study was 2-fold: On the one hand, we wanted to explore the difference between the two job settings (WFH and the office) in the context of the theoretically based job factors according to the JD-R model (Demerouti et al., 2001). On the other hand, we wanted to estimate the resources and demands with respect to WFH parents with childcare responsibilities.

Discussion of the findings

The results of the study clearly showed differences in job characteristics between WFH and working in the office, irrespective of the year of their assessment. While WFH employees reported lower levels of emotional demands, they also received lower social relationships with colleagues and managers. As expected, the organizational factors also showed different results. Decision latitude and work continuity were rated higher in WFH, while task clarity was lower, especially at the beginning of the pandemic. In line with previous literature (Antunes et al., 2023; Rebelo et al., 2024), work intensity exhibited varying directions. No

TABLE 3 Descriptive and *t*-test results comparing psychosocial job characteristics between WFH and the office.

Year	Workplace		WFH		*t*-test			
	M	*SD*	*M*	*SD*	*T*	*N*	Cohens *d*	*p*
Emotional demands								
T1	1.59	0.63	1.38	0.51	10.22***	445	0.486	<0.001
T2	1.53	0.59	1.38	0.50	8.67***	443	0.412	<0.001
T3	1.55	0.65	1.37	0.52	5.01***	148	0.434	<0.001
Social relationships with colleagues								
T1	3.67	0.46	3.59	0.51	4.97***	431	0.240	<0.001
T2	3.70	0.48	3.59	0.53	5.90***	462	0.274	<0.001
T3	3.71	0.44	3.66	0.47	2.87**	160	0.227	0.003
Social relationships with supervisors								
T1	3.43	0.63	3.31	0.68	7.73***	434	0.371	<0.001
T2	3.37	0.68	3.26	0.73	6.86***	452	0.323	<0.001
T3	3.41	0.67	3.32	0.72	2.78**	162	0.218	0.004
Decision latitude								
T1	3.18	0.69	3.24	0.68	−2.64*	466	0.122	0.006
T2	3.18	0.75	3.29	0.73	−4.77***	461	0.222	<0.001
T3	3.37	0.65	3.45	0.63	−3.01**	163	0.236	0.002
Work intensity								
T1	3.21	0.61	3.22	0.60	−0.35	449	0.017	0.441
T2	3.26	0.63	3.21	0.64	2.88**	466	0.133	0.002
T3	3.30	0.53	3.35	0.59	−1.67*	160	0.132	0.069
Work continuity								
T1	2.33	0.67	2.71	0.69	−11.90***	483	0.542	<0.001
T2	2.29	0.70	2.62	0.69	−11.98***	479	0.547	<0.001
T3	2.27	0.64	2.79	0.63	−10.03***	166	0.778	<0.001
Task clarity								
T1	3.57	0.55	3.48	0.59	5.32***	440	0.254	<0.001
T2	3.54	0.54	3.49	0.55	5.10***	437	0.244	<0.001
T3	3.65	0.51	3.64	0.50	0.15	156	0.012	0.440

Comparing the subcategories of PsyHealth in dependence of WFH or working in the office.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$. T1 = 2020, T2 = 2021, T3 = 2022.

approximation of job characteristics with respect to the two work locations was shown over time.

The study suggests consistent differences in workplace characteristics over time, with potential benefits for employees in the long run. After 3 years, WFH may no longer be as unfamiliar or challenging as it was at the beginning of the pandemic. Some companies are adopting hybrid and flexible solutions, allowing employees to split their work between the office and home. This approach, leveraging the improved conditions in WFH, especially in decision-making and work continuity, can be advantageous for tasks requiring concentration. In 2022, the substantial effect of work continuity and the medium effect of reduced emotional demands supported WFH. These advantages, coupled with improved relationships and enhanced task clarity, make WFH a valuable option for specific tasks, while face-to-face interactions in the office can be reserved for constructive communication.

In tandem with numerous studies (Barbieri et al., 2021; Ipsen et al., 2021; Lee, 2021; Becerra-Astudillo et al., 2022; Antunes et al., 2023; Demerouti and Bakker, 2023; Kruyen et al., 2023), our study illuminates the enduring impact of job demands, such as increased social isolation, while emphasizing the crucial role of organizational and individual resources in alleviating stress and enhancing job satisfaction. It is also essential to consider the complex interaction between the factors of the JD-R model during crises, like the COVID-19 pandemic, as elucidated by Demerouti and Bakker (2023). Although not explicitly addressed in this synthesis, the study by Becerra-Astudillo et al. (2022) remains integral to the overall discourse. Their exploration of the influence

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TABLE 4 Descriptive and *t*-test results between WFH people with and without parallel childcare roles.

Year	No childcare			Childcare			*t*-test		
	M	*SD*	*N*	*M*	*SD*	*N*	*T*	Cohens *d*	*p*
Emotional demands									
T1	1.38	0.51	350	1.40	0.51	86	−0.39	0.047	0.695
T2	1.36	0.48	375	1.49	0.57	71	−2.05	0.266	0.070
Social relationships with colleagues									
T1	3.58	0.51	343	3.65	0.49	89	−1.14	0.135	0.256
T2	3.60	0.52	390	3.55	0.54	76	0.77	0.096	0.443
Social relationships with supervisors									
T1	3.32	0.66	351	3.27	0.76	85	0.57	0.069	0.571
T2	3.27	0.72	385	3.19	0.75	73	0.82	0.105	0.411
Decision latitude									
T1	3.24	0.67	374	3.24	0.71	92	−0.05	0.006	0.961
T2	3.30	0.72	387	3.28	0.80	76	0.21	0.026	0.835
Work intensity									
T1	3.25	0.58	360	3.10	0.65	89	2.13*	0.252	0.034
T2	3.25	0.62	394	3.02	0.69	75	2.90**	0.366	0.004
Work continuity									
T1	2.77	0.68	388	2.45	0.68	95	4.08***	0.466	<0.001
T2	2.68	0.66	406	2.26	0.76	75	4.96***	0.624	<0.001
Task clarity									
T1	3.49	0.59	351	3.46	0.62	89	0.30	0.035	0.767
T2	3.50	0.55	367	3.44	0.55	71	0.84	0.109	0.401

Comparing the subcategories of PsyHealth in dependence of childcare during WFH.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$. T1 = 2020, T2 = 2021.

of teleworking on job satisfaction and productivity during the pandemic aligns with the broader theme of understanding the implications of remote work. The nuanced findings from Becerra-Astudillo et al. (2022), interwoven with those of Barbieri et al. (2021), Antunes et al. (2023), and Kruyen et al. (2023), collectively enrich our understanding of the dynamic interplay between WFH, job characteristics, and employee wellbeing.

Moreover, while our study identifies stable differences in job characteristics between WFH and office work over time, insights from Barbieri et al. (2021) complement this narrative by emphasizing the mediating role of job satisfaction and stress in shaping overall wellbeing. Similarly, Becerra-Astudillo et al. (2022) provide valuable insights into the influence of teleworking on job satisfaction and productivity during the pandemic, in alignment with the broader theme of understanding remote work in terms of its implications. As outlined by the JD-R model, and underpinned by the work of Demerouti and Bakker (2023), the observed reduction in emotional demands and sustained work continuity during WFH corresponds to increased resources in the home setting, while decreased social relationships and uncertain task clarity align with increased demands in the home setting. Recognizing these nuances is imperative for the implementation of hybrid work strategies, necessitating the provision of adequate resources, fostering effective communication, and addressing emerging demands during telework to optimize benefits and mitigate the challenges identified in the JD-R model.

The examination of work characteristics among WFH parents with childcare responsibilities showed a deterioration in work continuity and intensity, indicating increased interruptions and a mismatch between workload und work time. There were no meaningful differences between men and women caring for children in WFH settings. These effects were specific to the pandemic, linked to the closing of childcare opportunities, and the analysis was limited to the first 2 years of the pandemic. With the closure of schools and day-care facilities, WFH parents were required to simultaneously manage home-schooling and work, leading to predictable consequences of lower levels of continuity and intensity in their professional duties. However, the study did not reveal any other noteworthy negative effects for WFH parents with childcare roles.

Incorporating the JD-R model, our study provides crucial insights into the unique challenges faced by WFH parents, emphasized decreased work continuity and intensity due to the dual responsibilities of home-schooling and work. This aligns with the findings of Leroy et al. (2021), highlighting greater interruptions among WFH individuals, particularly women, during

TABLE 5 Descriptive and *t*-test results examining WFH men and women with childcare duties.

Year	Men			Women			*t*-test	
	M	*SD*	*N*	*M*	*SD*	*N*	*T*	Cohens *d*
Emotional demands								
T1	1.32	0.45	37	1.46	0.55	49	−1.25	0.271
T2	1.43	0.50	31	1.54	0.63	39	−0.78	0.187
Social relationships with colleagues								
T1	3.69	0.36	39	3.62	0.57	50	0.74	0.158
T2	3.47	0.58	30	3.60	0.53	45	−1.03	0.243
Social relationships with supervisors								
T1	3.36	0.61	37	3.20	0.86	48	1.01	0.221
T2	3.16	0.80	27	3.22	0.73	45	−0.35	0.085
Decision latitude								
T1	3.33	0.67	40	3.17	0.73	52	1.12	0.236
T2	3.31	0.75	30	3.30	0.77	45	0.04	0.010
Work intensity								
T1	3.23	0.62	36	3.02	0.66	53	1.57	0.339
T2	3.01	0.64	31	3.03	0.73	44	−0.13	0.030
Work continuity								
T1	2.33	0.61	40	2.54	0.71	55	−1.47	0.306
T2	2.09	0.64	30	2.34	0.78	44	−1.46	0.345
Task clarity								
T1	3.51	0.45	38	3.43	0.73	51	0.58	0.124
T2	3.28	0.62	26	3.52	0.50	44	−1.73	0.427

Comparing the subcategories of PsyHealth in dependence of sex with childcare and WFH.
T1 = 2020, T2 = 2021.

the COVID-19 pandemic. Focusing on the impact of privacy fit on work fatigue, the study of Weber et al. (2023) offers further context to the challenges associated with the working environment at home.

Collectively, these findings underscore the intricate relationship between job demands, such as interruptions and dual responsibilities, and the necessary resources, such as privacy fit, in shaping the WFH experience. The interconnected factors influencing work continuity and intensity among WFH parents contribute to a nuanced understanding of the remote work landscape, emphasizing the relevance of the JD-R model in guiding future interventions and strategies to support employee wellbeing in hybrid work settings. Importantly, in contrast to prior studies about wellbeing, job productivity, job satisfaction, and care tasks (Feng and Savani, 2020; Kohlrausch and Zucco, 2020; Hübener et al., 2021; Bernhardt et al., 2023), no significant difference in workplace characteristics was found between WFH women and men with childcare duties. This might have been due to the small sample size and the participants' diverse WFH conditions and family demands, the data on these aspects had not been collected. Descriptively, a higher level of work continuity was found among women. A relevant question here would be whether this was due to women being generally more accustomed to WFH and caring for children, or whether some other factors were in play.

Limitations

One main limitation of the study is that the three samples of the consecutive years are not comparable. As mentioned above, the samples were composed of different participants, precluding a longitudinal inferential statistical comparability. But, given the proportional overlap in the participants, we used the propensity score matching (PSM) technique (see Supplementary material) to replicate the results of the descriptive analysis and attempt an approximation of the longitudinal data. The longitudinal comparison of the 3 years showed no effects of the workplace due to familiarization with the pandemic. Another limitation is the self-report nature of the data. However, Pauli and Lang (2024) have shown that the measure used for assessing job characteristics in this study is robust toward any subjectivity bias due to its conditional and not person-centered item wording and its frequency response scale.

Additionally, in the third assessment year, the sample was significantly smaller than the previous ones. As the closure of schools and day-care centers was sporadic in 2022, there were only 13 participants who had childcare duties while WFH. Thus, there was not enough statistical power to calculate the research questions.

Furthermore, the reliability of the subscales for at least two job characteristics (i.e., work continuity and emotional demands) can increase the measurement error in the findings, the interpretation of which, therefore, should be made with caution. The findings should also be replicated in future studies and thus corroborated.

Implications and future directions

For theoretical considerations, the present study demonstrates that the psychosocial work characteristics of a particular job can differ in the level of occurrence depending on the job setting. This finding is particularly relevant as past research (e.g., Pousette and Hanse, 2002) has shown that the association paths from established job stress models may not universally apply across occupational contexts, questioning the generalizability of these models. Therefore, future studies should consider the specificities of the samples being investigated and their respective work environments.

In a similar vein, future investigations may explore whether the adaptation proposed by recent researchers (e.g., Kruyen et al., 2023) also holds for general psychosocial risk factors. This would necessitate examining specific industries based on the nature of tasks and accordingly scrutinizing the models for their validity. While there has not been enough consistent examination of identical tasks in different locations, our study has made significant strides in this regard, which may prove crucial for the continued and successful implementation of hybrid work models in diverse countries and industries.

As a practical implication, given the durable adoption of hybrid work models, more attention needs to be paid to occupational health and safety with respect to WFH. In Germany, the rules for protecting workers are set out in the Occupational Health and Safety Act (Arbeitsschutzgesetz). This also includes the consideration and assessment of psychosocial risk factors, which represent a major challenge for employers because they, unless duly considered, can lead to mental and physical illnesses (Rosário et al., 2016). These observations can help employers to better meet the needs of their employees and ensure the maintenance of psychosocial health by considering the relevant risks and intervening accordingly.

A practical recommendation for working parents would be that, since they are frequently forced to shoulder the dual responsibilities of work and childcare, they ought to have more flexible options in terms of time allocation and place of work. Should hybrid work models become the norm, it would be interesting to examine family structures and differences in WFH behavior between men and women. Future studies with longitudinal measurements with respect to participants involved in hybrid work models may shed valuable light on the actual habituation effects and consequences of psychosocial risk factors. Effective strategies may then be adopted for work design depending on the place of work.

In addition, only general psychological risk factors were assessed in this study. Although previous research has already identified many specific psychosocial risk factors for remote workers, e.g., the physical conditions (temperature, indoor air quality, and acoustics), there are other ergonomic aspects (commuting behavior, etc.) that lead to further challenges for WFH or work in the office (Holland, 2016; Awada et al., 2021; Ahmed et al., 2022). Given these methodological shortcomings of our study, and its lack of industry specification, more research ought to be conducted in this area focusing on the practical benefits of the hybrid work model in companies. Future research should also highlight the importance of risk assessment and investigate the validity of the previous job stress models in more detail.

In a nutshell, this study gives us a clear picture of the general psychosocial challenges at office workplaces that need to be considered for both research and practice. Future research should consider the different levels of job characteristics within the same work activity depending on the setting. Past research has indicated that the absolute levels of job stressors from general job stress models may cause distinct effects. Organizations, therefore, ought to develop strategies that might allow them to effectively schedule tasks according to the job setting of hybrid work models. Leaders can use this information to guide their work design and directives. The distinct resources of the two job settings should be strategically exploited not only for greater performance efficiency, but also for the prevention of negative strain outcomes. For the society as a whole, the promotion of better working conditions is likely to lead to a healthier workforce.

It may be safe to conclude, as a first step, that a hybrid work model, allowing demanding tasks to be performed at home and social resources to take place on days in the office, may combine the advantages of both job settings, minimizing the employees' psychosocial risk factors and augmenting both their satisfaction and productivity.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by the Ethikkomission of the Medicine Faculty, RWTH Aachen University. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

CP-R: Data curation, Formal analysis, Methodology, Writing—original draft. MS: Conceptualization, Writing—review & editing. TK: Conceptualization, Writing—review & editing. JL: Conceptualization, Investigation, Methodology, Project administration, Supervision, Writing—review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/forgp.2024.1352526/full#supplementary-material

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