New Technology, Work and Employment

RESEARCH ARTICLE

The Role of ICT Demands and Resources and Job Autonomy in the Work-Life Balance of Hybrid and High-Intensity Teleworkers

Kaire Piirsalu-Kivihall | Tiiu Paas | Anne Aidla

School of Economics and Business Administration, University of Tartu, Tartu, Estonia

Correspondence: Kaire Piirsalu-Kivihall (kaire.piirsalu-kivihall@ut.ee)

Received: 9 April 2024 | **Revised:** 5 June 2025 | **Accepted:** 24 June 2025

Keywords: hybrid work | ICT demands | ICT resources | job autonomy | telework | work-life balance

ABSTRACT

This study investigates the impact of perceived ICT demands, ICT resources, and job autonomy on work-life balance (WLB) in hybrid and high-intensity teleworking. Utilising survey data from the Estonian Salary Information Agency, the study includes 1495 full-time employees who work remotely using computers for more than half their work time. Regression results indicate distinct relationships between ICT demands/resources and WLB for hybrid and high-intensity teleworkers, with one exception: exhausting e-communication is negatively associated with WLB in both teleworker groups. Moderation analysis reveals that some ICT resources can slightly ease the negative impact of e-communication on WLB for hybrid but not high-intensity teleworkers. High job autonomy is an important job resource for both groups, but it may exacerbate the negative impact of exhausting e-communication on WLB. These findings contribute to ongoing discussions surrounding teleworkers' WLB by considering different telework intensities, job autonomy, and the role of ICT usage.

1 | Introduction

In recent years, concerns about teleworkers' work-life balance (WLB) have risen in public discussions. Despite several studies showing teleworkers enjoy a better WLB as well as less stress with the commute and child care (e.g., Gajendran and Harrison 2007; Golden 2006; Grant et al. 2013; Hilbrecht et al. 2013), numerous opposing studies are concluding that working from home may increase the pace of work, blur boundaries between work and family time and make it challenging to keep a healthy WLB (e.g., Allen et al. 2015; Felstead and Henseke 2017; Troup and Rose 2012; Vander Elst et al. 2017). In Europe, the issue concerns 22% of the EU27 workforce working from home at least some time, and potentially, over 60% of employees preferring to work from home at least occasionally (Eurofound 2023a).

Gajendran et al. (2024) found that higher levels of teleworking are associated with several gains, and the meta-analysis of Gajendran and Harrison (2007) showed that the intensity of teleworking plays a significant role in the WLB of teleworkers. Recent studies confirm that finding (Leung and Zhang 2017; Rodríguez-Modroño and López-Igual 2021), making it essential to distinguish between hybrid and high-intensity teleworkers (divided by the proportions of time working away from co-workers at another location) in the present research.

Teleworking involves working away from the office using ICTs (Boell et al. 2016). ICT could be the reason why teleworking, in particular, fosters working evenings and/or weekends (Camacho and Barrios 2022; Eurofound and the International Labour Office [ILO] 2017). According to Leung and Zhang (2017), the role of ICT is paradoxical, as it could be both liberating and constraining, creating new possibilities

either for autonomy or invasion. Hence, according to the Job Demands-Resources (JD-R) theory (Demerouti et al. 2001), ICT could be a job demand (a negative or stressful aspect of work—ICT demand in the current study) or a resource (a positive or motivating aspect—ICT resource). In addition to the ICT demands and resources, we included job autonomy in our research as several studies have shown that job autonomy helps to buffer the negative effect of job demands (Bakker et al. 2005; Sardeshmukh et al. 2012), and we examined whether this also applies to ICT demands.

Prior empirical research on job autonomy distinguishes between task discretion (the extent to which workers can take initiative within their current job tasks) and influence at the broader organisational level (Gallie et al. 2004; Ringqvist 2024). In organisational psychology, the ability to decide when and where to work is also often considered a component of job autonomy. From a critical perspective, job autonomy in the age of digital work may shift responsibility for work-life boundary-setting onto the individual while maintaining organisational expectations of constant connectivity and performance. As Mazmanian et al. (2013) have shown, knowledge workers believed that utilising mobile devices increased their flexibility and ability to perform as professionals, while in reality, it limited their autonomy. From this standpoint, job autonomy is not merely a personal resource supporting WLB, but part of a contested terrain shaped by managerial and technological pressures and institutionalised expectations of availability (see also Edwards 1979; Ringqvist 2024).

The JD-R theory originates in organisational psychology as a framework for understanding how job demands and resources influence employee well-being and performance (Bakker and Demerouti 2007; Demerouti et al. 2001). However, it also offers a theoretically valuable perspective for sociologists studying job-related outcomes (Tausig 2013). By applying the JD-R framework, this study aims to examine how different factors of ICT usage are perceived as a demand or a resource and how they shape the WLB of hybrid and high-intensity teleworkers. This paper strives to answer the following research questions: (1) Which ICT demands and resources are associated with the WLB, and do they differ depending on the intensity of telework?; (2) Do ICT resources and job autonomy buffer the relationship between ICT demands and WLB of hybrid and high-intensity teleworkers?

The empirical part of the study is based on survey data from the Estonian Salary Information Agency. The selected sample ($n = 1495$) includes full-time employees who use a computer for at least 51% of their work time and work in another location away from coworkers at least 26%. Statistical methods, such as principal axes factoring (PAF), regression, and moderation analysis, have been implemented to test the hypotheses about the possible relationship between ICT demands/resources and job autonomy and the WLB of hybrid and high-intensity teleworkers.

We contribute to the literature in two ways. First, as organisations strive to design technology as a resource (Demerouti 2022), this task becomes increasingly complex due to diverse telework practices. This study enhances our understanding of how ICT demands and resources relate to WLB, and how these relationships align with core propositions of the JD-R theory. Second, we demonstrate that ICT demands and resources are differently associated with WLB for hybrid versus high-intensity teleworkers, with one notable exception: exhausting e-communication is negatively associated with WLB in both teleworker groups. These findings highlight the necessity of considering telework intensity when studying remote workers and the various factors that shape their work experiences.

2 | Literature Review and Hypotheses Development

2.1 | ICT Demands/Resources and WLB

ICT demands and resources are derived from the JD-R theory that claims that psychosocial work characteristics can be divided into two groups, regardless of the type of job: job resources and job demands (Demerouti et al. 2001; Hakanen et al. 2008). *ICT demands* are explicitly related to ICT and could be described as aspects of ICT usage that require extra effort, create pressure, and disturb workflow (Bordi et al. 2018). Day et al. (2010) argue that the extent to which the work conditions that ICT imposes are perceived as taxing and exceeding employees' resources will determine how intensely employees view ICT as being negative and detrimental. Inversely, *ICT resources* refer to any technology-related factors from the work environment that may be perceived as supporting work goal achievement, alleviating negative impacts of job and ICT demands, and facilitating personal growth (Day et al. 2010).

There is no universally agreed classification of ICT demands and resources in the academic literature. Day et al. (2012) introduced the scales for eight ICT demands and two supports/resources. Stadin et al. (2021) developed a six-item ICT demand scale, and based on their qualitative study, Bordi et al. (2018) detected six ICT demands and one ICT resource. Other authors have also studied ICT demands and resources (e.g., Atanasoff and Venable 2017; Carlson et al. 2023; Mäkiniemi et al. 2019; Pfaffinger et al. 2022; Scholze and Hecker 2024). However, we can draw some similar features. For example, several studies have stated that constant connectivity/availability is one of the demanding factors of ICT usage (Ayyagari et al. 2011; Bordi et al. 2018; Day et al. 2012; Mirbabaie et al. 2022; Scholze and Hecker 2024). Also, technological problems (ICT hassles) (Bordi et al. 2018; Day et al. 2012; Stadin et al. 2021), increased workload (Atanasoff and Venable 2017; Day et al. 2012), and volume of digital communication (large number of e-mails and messages, or channels) (Bordi et al. 2018; Stadin et al. 2021) may create tensions for ICT users.

Research on ICT resources is more scarce (Hu et al. 2021). ICT resources can support effective information and communication transfer, facilitate interaction between workers, and provide flexibility in location (Bordi et al. 2018; Day et al. 2010; Demerouti et al. 2014). The survey by Bordi et al. (2018) concluded that flexibility in communication is a key ICT resource. Furthermore, Mäkiniemi et al. (2019) highlight technology-related self-efficacy, collegial support, autonomy,

and competence support, while Day et al. (2012) associate ICT support with reduced stress and strain.

We expect that ICT demands and resources have a relationship with WLB. Clark (2000, p. 751) defines WLB as 'satisfaction and good functioning at work and home with minimum role conflict'. Similarly, Guest (2002, p. 263) describes WLB as a perceived balance between work and the rest of life. The conflict between those domains arises when the demands of work and family contradict each other and restrict fulfilling work/family obligations (Leung and Zhang 2017). The constant use of ICT forces teleworkers to work longer hours and even on weekends (Camacho and Barrios 2022), and it reduces their WLB (Stankevičiūtė 2022). Yet, according to Day et al. (2010), ICT resources can mitigate the negative impacts of job and ICT demands. This claim is retrieved from the hypotheses of the JD-R theory (Demerouti et al. 2001), and several studies have shown corresponding results with job demands and resources (e.g., Bakker et al. 2005; Hakanen et al. 2005). However, according to the research of Ninaus et al. (2021), ICT demands have a substantial adverse impact on WLB, whereas ICT resources have no or a weak positive impact. Therefore, in the context of ICTs, this assumption requires more research.

As Leung and Zhang (2017) showed, the intensity of teleworking is positively related to work-family conflict and techno-overload. On the other hand, the study of Suh and Lee (2017) revealed that low-intensity teleworkers (corresponding to hybrid teleworkers in this study) were more vulnerable to technology-related stress, and the authors explained it with mixed roles and identities. Moreover, there are different results regarding the associations between the intensity of teleworking and positive outcomes. Some studies show that higher levels of teleworking are related to better WLB (e.g., Gajendran and Harrison 2007; Eurofound and the International Labour Office [ILO] 2017), but Vander Elst et al. (2017) found that the intensity of teleworking is not related to work-related well-being. Thus, we propose that ICT usage, one of the most essential aspects of teleworking, shapes the perception of WLB. We also suggest that associations between specific ICT demands and resources differ between hybrid and high-intensity teleworkers. However, the hypotheses on the difference and strength between associations of ICT demands, ICT resources, and WLB cannot be established based on literature, and it remains an explorative topic in our study. Therefore, we propose the following hypotheses:

H1a. *ICT demands have a statistically significant negative relationship with WLB for both (a) hybrid and (b) high-intensity teleworkers.*

H1b. *The combination of ICT demands that negatively affects WLB differs between hybrid and high-intensity teleworkers.*

H2a. *ICT resources have statistically significant positive relations with WLB for both (a) hybrid and (b) high-intensity teleworkers.*

H2b. *The combination of ICT resources that negatively affects WLB differs between hybrid and high-intensity teleworkers.*

H3. *ICT resources buffer the effect of ICT demands on WLB of both (a) hybrid and (b) high-intensity teleworkers.*

2.2 | Job Autonomy and WLB

Job autonomy includes the ability to manage one's own time and location in a way that follows individual needs and is closely linked to the ability to achieve a satisfactory WLB (Kelliher and Anderson 2008). In addition, the consensus is that job autonomy involves the autonomy of working methods (De Spiegelaere et al. 2016). Teleworkers may have more autonomy without a co-located manager, including deciding when and how to complete their task (Carlson et al. 2023). Maruyama et al. (2009) suggested that telework supports a positive WLB, even with longer hours, as long as workers can control their work time. Gajendran et al. (2024) concluded that job autonomy mediates the relationship between telework intensity and employee outcomes. Thus, job autonomy can shape the experience of the WLB for teleworkers at different levels of teleworking. Additionally, the research by Suh and Lee (2017) suggests that for high-intensity teleworkers, the role of job autonomy in reducing privacy invasion was much stronger than for low-intensity teleworkers.

Moreover, previous studies have shown that job autonomy helps reduce job demands' unfavourable impact (e.g., Bakker et al. 2005; Gajendran and Harrison 2007; Sardeshmukh et al. 2012). Therefore, we assume that job autonomy has a similar beneficial effect to WLB in relation to ICT demands. Although ICT usage has been positively connected to increases in employees' distress, this effect can be mitigated if employees are given the freedom to choose how to match ICT to their everyday responsibilities best (Day et al. 2010; Nam 2014). Furthermore, Leung and Zhang (2017) claim that the individuals' control over what passes through the work-home boundary determines the effects of ICT use.

Therefore, we expect that job autonomy is positively associated with the WLB of teleworkers, with high-intensity teleworkers having a potential advantage in this regard. Job autonomy can help buffer the negative relationship between ICT demands and WLB.

H4. *Job autonomy has a stronger positive relation to WLB for high-intensity teleworkers compared to hybrid teleworkers.*

H5. *Autonomy buffers the effects of ICT demands on WLB for both (a) hybrid and (b) high-intensity teleworkers.*

Figure 1 illustrates the conceptual model of the study.

3 | Methods

3.1 | Data

The data were obtained from the Estonian Salary Information Agency (ESIA), which conducts biannual surveys to provide insights on salaries and work-related issues to the private and

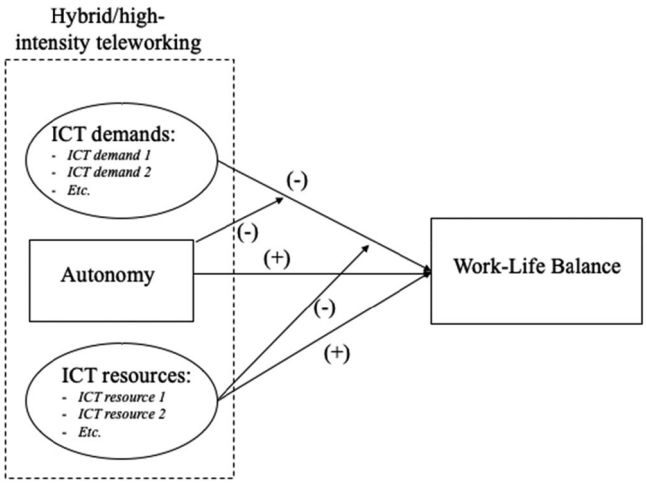

FIGURE 1 | Conceptual model of the study. (−) reducing the strength of the relationship, (+) reinforcing the strength of the relationship.

public sectors. The data set covers a diverse selection of sectors and occupations in all regions of Estonia. The survey from spring 2022, which included questions on ICT usage, was sent to a representative sample of 55,000 individuals, yielding 10,283 responses (approximately 18.7% response rate). The survey participation was anonymous, and the contact data could not be linked with responses.

We selected the sub-sample ($n = 1495$) of employees with full-time work contracts who use a computer for at least 51% and work in another location for at least 26% of their work time. There is no universally agreed measure for separating hybrid and high-intensity teleworkers. The most used description for hybrid working refers to working partly from the employers' premises and partly from home or elsewhere with the help of ICT (Vartiainen 2021). Bentley et al. (2016) defined teleworkers working remotely more than 8 h per week as hybrid teleworkers. In their study, Fonner and Roloff (2010) classified high-intensity teleworkers when they worked at least 3 days per week remotely. In the survey of ESIA, respondents were asked to choose the proportions of time they spend working away from co-workers at another location. Derived from those options and previous studies, we divided hybrid teleworkers working at another location 26%−75% (694 respondents) and high-intensity teleworkers 76%−100% of work time (801 respondents). 60% of respondents were women, 31.5% were men, and 8.5% preferred not to define their gender. The age groups included respondents: 16−24 year 3%, 25−34 year 32%, 35−44 year 34%, 45−54 year 19%, 55−64 year 10%, 65−74 year 2%, >75 year 0% (1 respondent). Regarding education, 32% had a Masters' degree, 27% Bachelors' degree, 13% had a secondary education, 13% professional higher education. The other education groups were represented in the sample with less than 10%. The education and age groups are in accordance with Estonia's statistics on remote workers; women are over-represented by 6%. Due to ESIA's more detailed classification of occupations and sectors, a direct comparison with national statistics is not feasible. One-third of the sample formed information and telecommunication technology (21%), and finance and accounting (11%) sectors. Almost half were mid-level (30.9%) and leading specialists (18.5%).

3.2 | Measures

We formed measures from the survey as follows. *ICT demands and resources*. The survey contained ten statements related to the negative aspects and seven related to the positive aspects of ICT usage. We used PAF as a dimensionality reduction technique to avoid complexity with modelling and to find latent factors. Some of our variables did not follow the normal distribution, and PAF does not entail distributional assumptions (Fabrigar et al. 1999). We found three factors for both ICT demands and resources. A more detailed explanation of the factors is presented in Section 3.4.

The job autonomy three-item measure included questions about work method, work time, and place of work (see De Spiegelaere et al. 2016 job autonomy dimensions) ($\alpha = 0.79$). The dependent variable, *the work-life balance*, was measured with two statements: 'I have enough free time besides work' and 'My work and personal life are well balanced'. ($\alpha = 0.84$). The responses were on a Likert scale from 'fully agree' (5) to 'fully disagree' (1), with higher results indicating better WLB and greater job autonomy. We excluded any missing values and calculated the mean scores for both variables, as each question carries equal weight in representing the concepts. Measures are presented in Appendix A. We also used gender, age group, education, occupation, and sector as *control variables*.

3.3 | Analysis

We used R software for the data analysis. As a first step, we ran diagnostic tests to determine whether questions about ICT's negative and positive aspects are appropriate for PAF. We used Kaiser−Meyer−Olkin and Bartlett's tests and checked the multicollinearity or singularity of the data. As a result, our data related to negative and positive statements about ICT usage proved suitable for PAF.

Secondly, we carried out PAF to find cluster structures that may be present among the cases (Critchley et al. 2008). In addition, to avoid concurrence in ICT resources and job autonomy, we performed a test PAF with both questions and achieved certainty that they were not overlapping.

Thirdly, we performed a multiple linear regression analysis for hybrid and high-intensity teleworkers to find the answer to RQ1 and test hypotheses H1, H2 and H4. We also tested the models for multicollinearity using the Variance Inflation Factor (VIF), heteroscedasticity with the Breusch−Pagan test, and omitted variables with the RESET test to ensure model validity. As the Breusch-Pagan test for the regression model of high-intensity teleworkers yielded a p value close to the recommended threshold ($p = 0.05256$), we computed the models with robust standard errors to ensure the reliability of our results.

Fourthly, to find the answer to the RQ2 and test hypotheses H3 and H5, we conducted the moderation analysis and examined the buffering effect of job autonomy and ICT resources on the relationship between ICT demands and WLB. When moderation is present, a third construct—the moderator—determines the direction and the intensity of a relationship between two

constructions (Hair et al. 2021). The ICT demands and resources were derived using PAF and expressed as standardised scores with means around zero, so no further centreing was needed. However, job autonomy was centred to aid in interpreting interaction effects in the moderation analysis, following Aiken and West (1991) and McClelland et al. (2017). The centred job autonomy variable was included as a moderator in the analysis.

3.4 | Results

The mean values of WLB indicate that high-intensity teleworkers perceive their WLB more positively (mean = 3.5) than hybrid teleworkers (mean = 3.36). Welch's *t*-test revealed this difference to be statistically significant. Additionally, ICT usage is perceived more as a resource than a demand, as reflected in the mean scores in Appendix A.

With the *PAF*, we identified three factors for ICT demands (the Tucker Lewis Index 0.955, RMSEA 0.059) and ICT resources (the Tucker Lewis Index 0.997, RMSEA 0.023). The questions, factors and loadings, and descriptive statistics are presented in Appendix A. Correlations are presented in Appendix B. We named ICT demands factors 'difficulties with ICT tools' (code: ictdifficulties), 'exhausting e-communication' (code: ecommun) and 'problems with e-mails and messages' (code: emailsmess), and ICT resources 'maintaining relations with the team and the manager' (code: relations), 'achieving work goals' (code: goalsachiev) and 'providing flexibility' (code: flexib). These factors were used in regression and moderation analyses.

Usually, the best factor structure includes no factors with fewer than three items and no item loading below 0.3 (e.g., Costello and Osborne 2019). In our study, two ICT resources factors include two items. We compared TLI, RMSEA and BIC for models with three and two factors, and the model with two factors, including more than two items per factor, did not meet the necessary levels of those tests. Moreover, the division into three ICT resource factors was more essentially grounded. Taking the above into account, we continued with three ICT resources factors.

The regression analysis (Appendix C) highlights notable differences in how ICT demands and resources relate to WLB across teleworker groups. For hybrid teleworkers, the only statistically significant negative relationship between ICT demands and WLB is exhausting e-communication (Coef. = −0.345, SE = 0.043, $p < 0.01$), indicating a precise and significant negative relationship with WLB. Among ICT resources, providing flexibility also affects the WLB (Coef. = 0.087, SE = 0.050, $p < 0.1$), indicating that while the perception of ICT as a provider of flexibility may contribute to WLB, its effect is relatively small. Additionally, job autonomy is positively significant for hybrid teleworkers' WLB (Coef. = 0.304, SE = 0.052, $p < 0.01$), highlighting its role as a key job resource for hybrid teleworkers.

For high-intensity teleworkers, two ICT demands are negatively associated with WLB. Like hybrid teleworkers, exhausting e-communication has a strong negative relationship with WLB (Coef. = −0.303, SE = 0.042, $p < 0.01$). Additionally, problems with the understandability and perceived unnecessariness of e-mails and messages are negatively associated with WLB, though to a lesser extent (Coef. = −0.096, SE = 0.050, $p < 0.1$). Moreover, two ICT resources demonstrate a relationship with WLB. First, maintaining relations with the team and the manager shows a moderate positive association (Coef. = 0.122, SE = 0.041, $p < 0.01$). Second, achieving work goals displays a weaker yet statistically significant positive association (Coef. = 0.080, SE = 0.040, $p < 0.05$). Similar to hybrid teleworkers, job autonomy has a strong positive relationship with WLB (Coef. = 0.377, SE = 0.050, $p < 0.01$), reinforcing its importance across both teleworking groups. Welch's *t*-test was used to assess whether the difference in job autonomy coefficients between the two groups is statistically significant; the result ($p = 0.695$) indicated that it is not.

In conclusion, the WLB of high-intensity teleworkers relates more to ICT demands and resources than hybrid teleworkers. Similar relationships in both groups are found only for the ICT demand of exhausting e-communication and the job resource of job autonomy. The summary of hypothesis testing is presented in Table 1.

We also conducted *a moderation analysis* to find the interaction effects of ICT resources and job autonomy on the relationship between ICT demands and WLB. We investigated whether these resources can buffer the negative relationship between exhausting e-communication demand and WLB, as it proved to be the most challenging ICT demand for both teleworker groups. Figure 2A,B shows statistically significant interactions with ICT resources for hybrid teleworkers. Specifically, interactions between the perception that ICT helps to achieve work goals and exhausting e-communication (Coef. = 0.09, $p < 0.05$) and between providing flexibility and exhausting e-communication (Coef. = 0.1, $p < 0.05$) were statistically significant, indicating that these moderators influence the relationship between exhausting e-communication demand and WLB. The third ICT resource—maintaining relationships with the team and the manager—did not have a moderation effect.

The interaction effect (Coef. = −0.08) between job autonomy and exhausting e-communication demand on WLB (Figure 2C) was statistically significant at the 0.1 level ($p < 0.1$), suggesting a potential interaction effect. However, this result should be interpreted with caution as it does not meet the more conventional 0.05 threshold for statistical significance.

For high-intensity teleworkers, no ICT resources resulted in statistically significant interaction effects. A small to moderate interaction effect (Coef. = −0.14, $p < 0.01$) was observed only for job autonomy (Figure 3). Additionally, as problems with understandability and unnecessariness of e-mails and messages was a statistically significant ICT demand for high-intensity teleworkers, we explored interactions with this demand but found no statistically significant results.

In summary, two ICT resources act as moderators between exhausting e-communication and WLB for hybrid teleworkers, while none appear to exert an effect on high-intensity teleworkers. Unexpectedly, job autonomy may amplify both groups' negative associations between e-communication and WLB.

TABLE 1 | Summary of hypothesis testing.

	Hypothesis	Method	Hypothesis confirmation
H1a, a	ICT demands have statistically significant negative relations with WLB for hybrid teleworkers.	Multiple linear regression analysis	Partially confirmed
H1a, b	ICT demands have statistically significant negative relations with WLB for high-intensity teleworkers.	Multiple linear regression analysis	Partially confirmed
H1b	The combination of ICT demands that negatively affects WLB differs between hybrid and high-intensity teleworkers.	Multiple linear regression analysis	Partially confirmed
H2a, a	ICT resources have statistically significant positive relations with WLB for hybrid teleworkers.	Multiple linear regression analysis	Partially confirmed
H2a, b	ICT resources have statistically significant positive relations with WLB for high-intensity teleworkers.	Multiple linear regression analysis	Partially confirmed
H2b	The combination of ICT resources that positively affects WLB differs between hybrid and high-intensity teleworkers.	Multiple linear regression analysis	Confirmed
H3, a	ICT resources buffer the effect of ICT demands on WLB of hybrid teleworkers.	Moderation analysis	Partially confirmed
H3, b	ICT resources buffer the effect of ICT demands on WLB of high-intensity teleworkers.	Moderation analysis	Rejected
H4	Job autonomy has a stronger positive relation to WLB for high-intensity teleworkers compared to hybrid teleworkers.	Multiple linear regression analysis, Welch's t-test	Rejected
H5, a	Autonomy buffers the effects of ICT demands on WLB for hybrid teleworkers.	Moderation analysis	Rejected
H5, b	Autonomy buffers the effects of ICT demands on WLB for high-intensity teleworkers.	Moderation analysis	Rejected

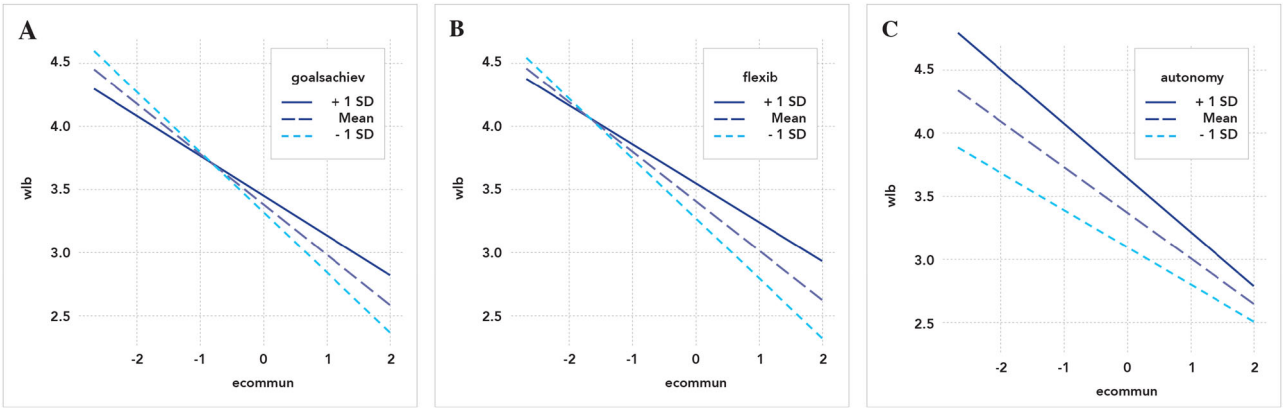

FIGURE 2 | (A) The buffering effect of the ICT resource *helping to achieve work goals* on the relationship between the *exhausting e-communication* demand and work-life balance. (B) The buffering effect of the ICT resource *providing flexibility* on the relationship between the *exhausting e-communication* demand and work-life balance among hybrid teleworkers. (C) The enhancing effect of *job autonomy* on the relationship between the *exhausting e-communication* demand and work-life balance among hybrid teleworkers. [Color figure can be viewed at wileyonlinelibrary.com]

4 | Discussion

In recent years, employees and organisations have been forced to adapt to the expansion of telework practices. While ICT facilitates teleworking, it introduces demanding and motivating aspects and influences the WLB of teleworking employees. Objectively and subjectively, WLB is one of the central elements of quality of work (Kremer et al. 2021). Our study aimed to elucidate the role of ICT demands and resources in the conditions of hybrid and high-intensity teleworking on WLB in a

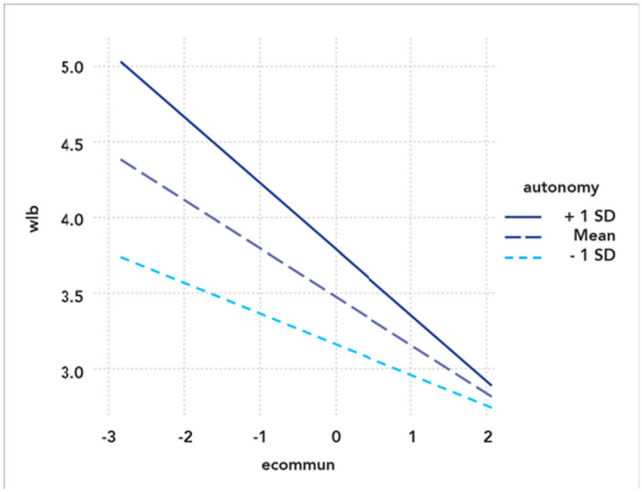

FIGURE 3 | The enhancing effect of *job autonomy* on the relationship between the *exhausting e-communication* demand and work-life balance among high-intensity teleworkers. [Color figure can be viewed at wileyonlinelibrary.com]

sample of 1495 hybrid and high-intensity teleworkers. To the best of our knowledge, this is the first study to investigate relations between specific ICT demands and resources and WLB in hybrid and high-intensity teleworking conditions.

Our study reveals that high-intensity teleworkers assess their WLB higher than hybrid teleworkers. From the survey of ESIA, we could identify three ICT demands and three ICT resources. However, not all ICT demands and resources affect the WLB of hybrid and high-intensity teleworkers. We found that the WLB of hybrid teleworkers is less affected by ICT demands and that exhausting e-communication may only harm it. Similarly, only one of the three ICT resources—perception of ICT as a tool providing flexibility—had a statistically significant positive relation to WLB. The relations between ICT demands and resources, and WLB are more complex for high-intensity teleworkers. The statistically significant adverse effects on WLB included exhausting e-communication as well as problems of understandability and unnecessary e-mails and messages. This may be caused by the fact that hybrid teleworkers can communicate more face-to-face, but for high-intensity teleworkers, e-mails and messages are the primary communication tools. Moreover, for high-intensity teleworkers, two ICT resources also positively affect WLB—the more people perceive that ICT tools and solutions help them maintain relations with the team and the manager and achieve work goals, the higher they perceive their WLB. Thus, according to our study, the WLB of high-intensity teleworkers is more related to positive and negative aspects of ICT usage than hybrid teleworkers, which aligns with the study of Leung and Zhang (2017).

Our results also indicate that job autonomy significantly positively affects WLB for both hybrid and high-intensity teleworkers, and previous studies have received similar results (e.g., Hill et al. 2001; ter Hoeven and van Zoonen 2015; Maruyama et al. 2009). However, we did not find a difference in the relationship between job autonomy and WLB based on the intensity of teleworking, which contrasts with some previous studies (e.g., Gajendran et al. 2024; Suh and Lee 2017). The difference may be attributed to the fact that our study relies on post-COVID data, suggesting that employees now have more experience with various modes of teleworking, which diminished the problem of mixed roles and identities of hybrid teleworkers, as proposed by Suh and Lee (2017). This aligns with Carlson et al. (2023), who found that teleworking experience impacts perceptions of WLB.

Furthermore, according to the JD-R model (Demerouti et al. 2001, 501), job resources help to reduce job demands. In line with the studies on job demands and resources (e.g., Bakker et al. 2005; Hakanen et al. 2005), we assumed that ICT resources and job autonomy could mitigate the negative relationship between ICT demands and WLB. The moderation analysis revealed a weak buffering effect of two ICT resources—providing flexibility and helping to achieve work goals—on WLB among hybrid teleworkers. The buffering effect on the associations between ICT demands and WLB was missing for high-intensity teleworkers. This aligns with the study of Ninaus et al. (2021), which found that ICT resources may not lessen the negative effects of working life. This result is intriguing, implying that we cannot expect the alleviating effect of ICT resources on ICT demands in every context.

In addition, we found that when job autonomy is higher, the negative relationship between exhausting e-communication and WLB may be amplified. This result was only marginally significant for hybrid teleworkers but more pronounced for high-intensity teleworkers. Thus, while perceived job autonomy is generally important for improving WLB among both groups, its effect may be negligible—or even counterproductive—when demands for e-communication are high. According to the extended JD-R model by Demerouti and Bakker (2022), in addition to individual strategies, strategies used by different actors like the leader, the team, and the organisation could modify the impact of demands and resources. Therefore, our findings highlight the importance of examining not only subjective perceptions but also structural and organisational factors—such as ICT use norms, managerial expectations, and assigned autonomy over their work—that influence WLB in digitalised work settings. The responsibility for managing work-life boundaries should not rest solely on the shoulders of teleworkers.

According to Demerouti (2022), digitalisation can promote 'healthy' jobs when it is designed to support employees' work, provides them with control over how to use it effectively, and ensures that job resources are maximised while job demands remain manageable. This study advances our understanding of ICT demands and resources as well as the WLB of teleworkers in several ways. Our findings indicate that ICT usage can impact the WLB of teleworkers differently depending on the intensity of telework. Moreover, we highlight the importance of distinguishing between specific ICT demands and resources rather than treating them as generalised. Furthermore, our results support Biron and van Veldhoven's (2016) proposition that there may be an optimal level of job autonomy beyond which it can become a demand for teleworkers—particularly in contexts of high e-communication demands.

4.1 | Practical Implications

We have several recommendations for organisations to improve the WLB of their hybrid and high-intensity teleworkers. Firstly, hybrid and high-intensity teleworkers have similarities but also differences regarding ICT usage and WLB. Organisations should address e-communication exhaustion by reducing information overload, limiting e-communication channels, managing constant availability, and refining virtual meeting practices. Applying the right to disconnect in the organisation (Eurofound 2023b) and thoughtfully focusing communication efforts can enhance WLB. Secondly, granting job autonomy—such as the right to decisions in work methods, time, and location—supports WLB. However, in case of exhausting ways of e-communication in organisations, too much autonomy may exacerbate its adverse effect on WLB. Thirdly, we do not see that the attempts to diminish ICT demands with the help of strengthening ICT resources could be effective and, thus, improve the WLB of employees. Therefore, we recommend that line managers gain a better understanding of their teams' expectations of technology use to improve collaboration and communication.

4.2 | Limitations and Future Research

The present study has some limitations. As ESIA's survey included ICT-related questions only once, our study is cross-sectional and relies on a limited set of ICT questions, with ESIA's primary focus on other topics. Additionally, the study was conducted solely in one state, limiting comparisons with other countries. Estonia is a technologically advanced country with a fully digitalised administration (Hartleb 2020), and people may be more used to ICTs in everyday life.

There is a need for more clarity regarding ICT resources. While various studies have highlighted different ICT resources, we agree with Hu et al. (2021) on the necessity for more focused research on the resource aspect, as ICT will increasingly play a vital role in employees' work.

Acknowledgements

We thank Jari Hakanen for his valuable comments and suggestions on our manuscript. Additionally, we appreciate the collaborative efforts of Kadri Seeder, CEO of the Estonian Salary Information Agency. In addition, we are very grateful to the editor, Robert MacKenzie, and the two anonymous reviewers for their thoughtful and thorough feedback, which has significantly helped to improve this paper.

Conflicts of Interest

The authors declare no conflicts of interest.

References

Aiken, L. S., and S. G. West. 1991. *Multiple Regression: Testing and Interpreting Interactions*. Sage.

Allen, T. D., T. D. Golden, and K. M. Shockley. 2015. "How Effective Is Telecommuting? Assessing the Status of Our Scientific Findings." *Psychological Science in the Public Interest* 16, no. 2: 40–68. https://doi.org/10.1177/1529100615593273.

Atanasoff, L., and M. A. Venable. 2017. "Technostress: Implications for Adults in the Workforce." *Career Development Quarterly* 65, no. 4: 326–338. https://doi.org/10.1002/cdq.12111.

Ayyagari, G., R. Purvis, and V. Grover. 2011. "Technostress: Technological Antecedents and Implications." *MIS Quarterly* 35, no. 4: 831. https://doi.org/10.2307/41409963.

Bakker, A. B., and E. Demerouti. 2007. "The Job Demands-Resources Model: State of the Art." *Journal of Managerial Psychology* 22, no. 3: 309–328. https://doi.org/10.1108/02683940710733115.

Bakker, A. B., E. Demerouti, and M. C. Euwema. 2005. "Job Resources Buffer the Impact of Job Demands on Burnout." *Journal of Occupational Health Psychology* 10, no. 2: 170–180. https://doi.org/10.1037/1076-8998.10.2.170.

Bentley, T. A., S. T. T. Teo, L. McLeod, F. Tan, R. Bosua, and M. Gloet. 2016. "The Role of Organisational Support in Teleworker Wellbeing: A Socio-Technical Systems Approach." *Applied Ergonomics* 52: 207–215. https://doi.org/10.1016/j.apergo.2015.07.019.

Biron, M., and M. van Veldhoven. 2016. "When Control Becomes a Liability Rather Than an Asset: Comparing Home and Office Days Among Part-Time Teleworkers." *Journal of Organizational Behavior* 37, no. 8: 1317–1337. https://doi.org/10.1002/job.2106.

Boell, S. K., D. Cecez-Kecmanovic, and J. Campbell. 2016. "Telework Paradoxes and Practices: The Importance of the Nature of Work." *New Technology, Work and Employment* 31, no. 2: 114–131. https://doi.org/10.1111/ntwe.12063.

Bordi, L., J. Okkonen, J.-P. Mäkiniemi, and K. Heikkilä-Tammi. 2018. "Communication in the Digital Work Environment: Implications for Wellbeing at Work." Supplement, *Nordic Journal of Working Life Studies* 8, no. S3: 29–48. https://doi.org/10.18291/njwls.v8iS3.105275.

Camacho, S., and A. Barrios. 2022. "Teleworking and Technostress: Early Consequences of a COVID-19 Lockdown." *Cognition, Technology & Work (Online)* 24, no. 3: 441–457. https://doi.org/10.1007/s10111-022-00693-4.

Carlson, D. S., S. J. Perry, M. Kacmar, M. Wan, and M. J. Thompson. 2023. "When Work and Family Collide: 'Resource Caravans' of Personal and Contextual Resources in Remote Work." *New Technology, Work and Employment* 39: ntwe.12274. https://doi.org/10.1111/ntwe.12274.

Clark, S. C. 2000. "Work/Family Border Theory: A new Theory of Work/Family Balance." *Human Relations* 53 no. 6: 747–770. https://doi.org/10.1177/0018726700536001.

Costello, A. B., and J. Osborne. 2019. *Best Practices in Exploratory Factor Analysis: Four Recommendations for Getting the Most From Your Analysis*. University of Massachusetts Amherst. https://doi.org/10.7275/JYJ1-4868.

Critchley, F., A. Pires, and C. Amado. 2008. *Principal Axis Analysis*. https://www.researchgate.net/publication/265758975_Principal_Axis_Analysis.

Day, A., S. Paquet, N. Scott, and L. Hambley. 2012. "Perceived Information and Communication Technology (ICT) Demands on Employee Outcomes: The Moderating Effect of Organizational ICT Support." *Journal of Occupational Health Psychology* 17, no. 4: 473–491. https://doi.org/10.1037/a0029837.

Day, A., N. Scott, and K. E. Kevin. 2010. "Information and Communication Technology: Implications for Job Stress and Employee Well-Being." In *New Developments in Theoretical and Conceptual Approaches to Job Stress*, edited by P. L. Perrewé and D. C. Ganster, 8, 317–350. Emerald Group Publishing Limited. https://doi.org/10.1108/S1479-3555(2010)0000008011.

Demerouti, E. 2022. "Turn Digitalization and Automation to a Job Resource." *Applied Psychology* 71, no. 4: 1205–1209. https://doi.org/10.1111/apps.12270.

Demerouti, E., and A. B. Bakker. 2022. "Job Demands-Resources Theory In Times of Crises: New Propositions." *Organizational Psychology Review* 13: 209–236. https://doi.org/10.1177/20413866221135022.

Demerouti, E., A. B. Bakker, F. Nachreiner, and W. B. Schaufeli. 2001. "The Job Demands-Resources Model of Burnout." *Journal of Applied Psychology* 86, no. 3: 499–512. https://doi.org/10.1037/0021-9010.86.3.499.

Demerouti, E., D. Derks, L. L. ten Brummelhuis, and A. B. Bakker. 2014. "New Ways of Working: Impact on Working Conditions, Work–Family Balance, and Well-Being." In *The Impact of ICT on Quality of Working Life*, edited by C. Korunka and P. Hoonakker, 123–141. Springer Netherlands. https://doi.org/10.1007/978-94-017-8854-0_8.

Edwards, R. 1979. *Contested Terrain: The Transformation of the Workplace in the Twentieth Century*. Basic Books.

Vander Elst, T., R. Verhoogen, M. Sercu, A. Van den Broeck, E. Baillien, and L. Godderis. 2017. "Not Extent of Telecommuting, But Job Characteristics as Proximal Predictors of Work-Related Well-Being." *Journal of Occupational and Environmental Medicine* 59, no. 10: 180. https://doi.org/10.1097/JOM.0000000000001132.

Eurofound. 2023a. *Living and Working in Europe 2022*. Publications Office of the European Union.

Eurofound. 2023b. *Right to Disconnect: Implementation and Impact at Company Level*. Publications Office of the European Union.

Eurofound and the International Labour Office (ILO). 2017. *Working Anytime, Anywhere: The Effects on the World of Work*. Publications Office of the European Union and the International Labour Office.

Fabrigar, L. R., D. T. Wegener, R. C. MacCallum, and E. J. Strahan. "Evaluating the Use of Exploratory Factor Analysis in Psychological Research". 1999.

Felstead, A., and G. Henseke. 2017. "Assessing the Growth of Remote Working and Its Consequences for Effort, Well-Being and Work-Life Balance." *New Technology, Work and Employment* 32, no. 3: 195–212. https://doi.org/10.1111/ntwe.12097.

Fonner, K. L., and M. E. Roloff. 2010. "Why Teleworkers Are More Satisfied With Their Jobs Than Are Office-Based Workers: When Less Contact Is Beneficial." *Journal of Applied Communication Research* 38, no. 4: 336–361. https://doi.org/10.1080/00909882.2010.513998.

Gajendran, R. S., and D. A. Harrison. 2007. "The Good, the Bad, and the Unknown About Telecommuting: Meta-Analysis of Psychological Mediators and Individual Consequences." *Journal of Applied Psychology* 92, no. 6: 1524–1541. https://doi.org/10.1037/0021-9010.92.6.1524.

Gajendran, R. S., A. R. Ponnapalli, C. Wang, and A. A. Javalagi. 2024. "A Dual Pathway Model of Remote Work Intensity: A Meta-Analysis of Its Simultaneous Positive and Negative Effects." *Personnel Psychology* 77: peps.12641. https://doi.org/10.1111/peps.12641.

Gallie, D., A. Felstead, and F. Green. 2004. "Changing Patterns of Task Discretion in Britain." *Work, Employment and Society* 18, no. 2: 243–266. https://doi.org/10.1177/09500172004042769.

Golden, T. D. 2006. "The Role of Relationships in Understanding Telecommuter Satisfaction." *Journal of Organizational Behavior* 27, no. 3: 319–340. https://doi.org/10.1002/job.369.

Grant, C. A., L. M. Wallace, and P. C. Spurgeon. 2013. "An Exploration of the Psychological Factors Affecting Remote E-Worker's Job Effectiveness, Well-Being and Work-Life Balance." *Employee Relations* 35, no. 5: 527–546. https://doi.org/10.1108/ER-08-2012-0059.

Guest, D. E. 2002. "Perspectives on the Study of Work-Life Balance." *Social Science Information* 41, no. 2: 255–279. https://doi.org/10.1177/0539018402041002005.

Hair, J. F., G. T. M. Hult, C. M. Ringle, M. Sarstedt, N. P. Danks, and S. Ray. 2021. "Moderation Analysis." In *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook*, edited by J. F. Hair Jr., G. T. M. Hult, C. M. Ringle, M. Sarstedt, N. P. Danks, and S. Ray, 155–172. Springer International Publishing. https://doi.org/10.1007/978-3-030-80519-7_8.

Hakanen, J. J., A. B. Bakker, and E. Demerouti. 2005. "How Dentists Cope With Their Job Demands and Stay Engaged: The Moderating Role of Job Resources." *European Journal of Oral Sciences* 113, no. 6: 479–487. https://doi.org/10.1111/j.1600-0722.2005.00250.x.

Hakanen, J. J., W. B. Schaufeli, and K. Ahola. 2008. "The Job Demands-Resources Model: A Three-Year Cross-Lagged Study of Burnout, Depression, Commitment, and Work Engagement." *Work & Stress* 22, no. 3: 224–241. https://doi.org/10.1080/02678370802379432.

Hartleb, F. 2020. "E-Estonia—'Europe's Silicon Valley' or a New '1984'?" In *Redesigning Organizations*, edited by D. Feldner, 215–228. Springer International Publishing. https://doi.org/10.1007/978-3-030-27957-8_16.

Hilbrecht, M., S. M. Shaw, L. C. Johnson, and J. Andrey. 2013. "Remixing Work, Family and Leisure: Teleworkers' Experiences of Everyday Life." *New Technology, Work and Employment* 28, no. 2: 130–144. https://doi.org/10.1111/ntwe.12010.

Hill, E. J., A. J. Hawkins, M. Ferris, and M. Weitzman. 2001. "Finding an Extra Day a Week: The Positive Influence of Perceived Job Flexibility on Work and Family Life Balance." *Family Relations* 50, no. 1: 49–58. https://doi.org/10.1111/j.1741-3729.2001.00049.x.

ter Hoeven, C. L., and W. van Zoonen. 2015. "Flexible Work Designs and Employee Well-Being: Examining the Effects of Resources and Demands." *New Technology, Work and Employment* 30, no. 3: 237–255. https://doi.org/10.1111/ntwe.12052.

Hu, X., Y. Park, A. Day, and L. K. Barber. 2021. "Time to Disentangle the Information and Communication Technology (ICT) Constructs: Developing a Taxonomy Around ICT Use for Occupational Health Research." *Occupational Health Science* 5, no. 1–2: 217–245. https://doi.org/10.1007/s41542-021-00085-6.

Kelliher, C., and D. Anderson. 2008. "For Better or for Worse? An Analysis of How Flexible Working Practices Influence Employees' Perceptions of Job Quality." *International Journal of Human Resource Management* 19, no. 3: 419–431. https://doi.org/10.1080/09585190801895502.

Kremer, M., R. Went, and G. Engbersen. 2021. *Better Work: The Impact of Automation, Flexibilization and Intensification of Work*. Springer International Publishing. https://doi.org/10.1007/978-3-030-78682-3.

Leung, L., and R. Zhang. 2017. "Mapping ICT Use at Home and Telecommuting Practices: A Perspective From Work/Family Border Theory." *Telematics and Informatics* 34, no. 1: 385–396. https://doi.org/10.1016/j.tele.2016.06.001.

Mäkiniemi, J.-P. I., S. Ahola, and J. Joensuu. 2019. "How are Technology-Related Workplace Resources Associated With Techno-Work Engagement Among a Group of Finnish Teachers?" *Seminar.net—International Journal of Media, Technology and Lifelong Learning* 15, no. 1: 21.

Maruyama, T., P. G. Hopkinson, and P. W. James. 2009. "A Multivariate Analysis of Work-Life Balance Outcomes From a Large-Scale Telework Programme." *New Technology, Work and Employment* 24, no. 1: 76–88. https://doi.org/10.1111/j.1468-005X.2008.00219.x.

Mazmanian, M., W. J. Orlikowski, and J. Yates. 2013. "The Autonomy Paradox: The Implications of Mobile Email Devices for Knowledge Professionals." *Organization Science* 24, no. 5: 1337–1357. https://doi.org/10.1287/orsc.1120.0806.

McClelland, G. H., J. R. Irwin, D. Disatnik, and L. Sivan. 2017. "Multicollinearity is a Red Herring in the Search for Moderator Variables: A Guide to Interpreting Moderated Multiple Regression Models and a Critique of Iacobucci, Schneider, Popovich, and Bakamitsos (2016)." *Behavior Research Methods* 49, no. 1: 394–402. https://doi.org/10.3758/s13428-016-0785-2.

Mirbabaie, M., L.-M. Braun, and J. Marx. "Knowledge Work 'Unplugged' - Digital Detox Effects on ICT Demands, Job Performance and Satisfaction". 2022.

Nam, T. 2014. "Technology Use and Work-Life Balance." *Applied Research in Quality of Life* 9, no. 4: 1017–1040. https://doi.org/10.1007/s11482-013-9283-1.

Ninaus, K., S. Diehl, and R. Terlutter. 2021. "Employee Perceptions of Information and Communication Technologies in Work Life, Perceived Burnout, Job Satisfaction and the Role of Work-Family Balance." *Journal of Business Research* 136: 652–666. https://doi.org/10.1016/j.jbusres.2021.08.007.

Pfaffinger, K. F., J. A. M. Reif, and E. Spieß. 2022. "When and Why Telepressure and Technostress Creators Impair Employee Well-Being." *International Journal of Occupational Safety and Ergonomics* 28, no. 2: 958–973. https://doi.org/10.1080/10803548.2020.1846376.

Ringqvist, J. 2024. "Integrating Collective Voice Within Job Demands–Resources Theory." *Work, Employment and Society* 38: 1465–1484. https://doi.org/10.1177/09500170241254306.

Rodríguez-Modroño, P., and P. López-Igual. 2021. "Job Quality and Work—Life Balance of Teleworkers." *International Journal of Environmental Research and Public Health* 18, no. 6: 3239. https://doi.org/10.3390/ijerph18063239.

Sardeshmukh, S. R., D. Sharma, and T. D. Golden. 2012. "Impact of Telework on Exhaustion and Job Engagement: A Job Demands and Job Resources Model." *New Technology, Work and Employment* 27, no. 3: 193–207. https://doi.org/10.1111/j.1468-005X.2012.00284.x.

Scholze, A., and A. Hecker. 2024. "The Job Demands-Resources Model as a Theoretical Lens for the Bright and Dark Side of Digitization." *Computers in Human Behavior* 155: 108177. https://doi.org/10.1016/j.chb.2024.108177.

De Spiegelaere, S., G. Van Gyes, and G. Van Hootegem. 2016. "Not All Autonomy is the Same. Different Dimensions of Job Autonomy and Their Relation to Work Engagement & Innovative Work Behavior: Not All Autonomy is the Same." *Human Factors and Ergonomics in Manufacturing & Service Industries* 26, no. 4: 515–527. https://doi.org/10.1002/hfm.20666.

Stadin, M., M. Nordin, A. Broström, L. L. Magnusson Hanson, H. Westerlund, and E. I. Fransson. 2021. "Technostress Operationalised as Information and Communication Technology (ICT) Demands Among Managers and Other Occupational Groups—Results From the Swedish Longitudinal Occupational Survey of Health (SLOSH)." *Computers in Human Behavior* 114: 106486. https://doi.org/10.1016/j.chb.2020.106486.

Stankevičiūtė, Ž. 2022. "The Dark Side of Technology Use: The Relationship Between Technostress Creators, Employee Work-Life Balance, and Job Burnout While Working Remotely During the COVID-19 Lockdown." In *Intelligent Techniques for Efficient Use of Valuable Resources*, edited by L. Ivascu, L.-I. Cioca, and F. G. Filip, 227, 119–138. Springer International Publishing. https://doi.org/10.1007/978-3-031-09928-1_8.

Suh, A., and J. Lee. 2017. "Understanding Teleworkers' Technostress and its Influence on Job Satisfaction." *Internet Research* 27, no. 1: 140–159. https://doi.org/10.1108/IntR-06-2015-0181.

Tausig, M. 2013. "The Sociology of Work and Well-Being." In *Handbook of the Sociology of Mental Health*, edited by C. S. Aneshensel, J. C. Phelan, and A. Bierman, 433–455. Springer Netherlands. https://doi.org/10.1007/978-94-007-4276-5_21.

Troup, C., and J. Rose. 2012. "Working From Home: Do Formal or Informal Telework Arrangements Provide Better Work–Family Outcomes?" *Community, Work & Family* 15, no. 4: 471–486. https://doi.org/10.1080/13668803.2012.724220.

Vartiainen, M. 2021. "Telework and Remote Work." In *Oxford Research Encyclopedia of Psychology*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190236557.013.850.

Appendix A

TABLE A1 | Descriptive statistics of measurement items.

Construct/factor (code)	Questions	Mean likert scale 1 (low)-5 (high)	SD	Path loading	Cronbach's α
ICT demands					
Difficulties with ICT tools (ictdifficulties)	New ICT tools or solutions created stress	1.7	1.0	0.9	0.77
	I could not handle using ICT tools or solutions	1.4	0.8	0.6	
	Problems with ICT tools prevented the work from being done	2.0	1.0	0.6	
Exhausting e-communication (ecommun)	The amount of information coming from e-communication channels was exhausting	3.0	1.1	0.9	0.74
	Using different e-communication channels caused stress	2.4	1.1	0.6	
	I felt like I had to be available all the time	3.5	1.3	0.4	
	Participating in virtual meetings caused fatigue	2.4	1.3	0.4	
Problems with e-mails and messages (emailsmess)	It was difficult to understand the content of e-mails or messages	2.1	0.9	0.6	0.72
	Information from e-communication channels was unnecessary	2.7	1.0	0.6	
	E-mails or messages interfered with the concentration	2.5	1.1	0.5	
ICT resources					
Maintaining relations with the team and the manager (relations)	ICT tools and solutions help to create a feeling of a united team	3.0	1.3	0.9	0.83
	Help maintain good relations with co-workers	3.4	1.6	0.7	
	Enable my manager to support me remotely	3.6	1.3	0.6	
Achieving work goals (goalsachiev)	Help me organise my work better	4.1	1.0	0.8	0.9
	Help me achieve better work results	4.0	1.1	0.8	
Providing flexibility (flexib)	Allow me to choose the location of my work	4.3	1.1	0.8	0.79
	Allow me to choose my working hours	3.9	1.3	0.7	
Work-life balance	I have enough free time besides work	3.4	1.1		0.84
	My work and personal life are well balanced	3.4	1.1		
Autonomy	I have enough autonomy to organise my work/choose work methods and ways	4.1	0.9		0.79
	I have enough autonomy to organise my working time	4.0	1.1		
	I have enough autonomy to organise my work location	4.2	1.0		

Appendix B

TABLE B1 | Correlations of ICT demands, ICT resources, job autonomy and WLB.

	Ecommun	Ictdifficulties	Emailsmess	Goalsachiev	Relations	Flexib	Autonomy
Ecommun							
Ictdifficulties	0.044						
Emailsmess	0.254***	0.100***					
Goalsachiev	−0.003	−0.088***	−0.077**				
Relations	−0.020	0.049	−0.088***	0.037			
Flexib	0.013	−0.095***	−0.045	0.195***	0.041		
Autonomy	−0.111***	−0.126***	−0.126***	0.057*	0.084**	0.411***	
WLB	−0.326***	−0.080**	−0.172***	0.061*	0.134***	0.131***	0.318***

Abbreviations: ecommun = exhausting e-communication, emailsmess = problems with e-mails and messages, flexib = providing flexibility, goalsachiev = achieving work goals, ICT demands—ictdifficulties = difficulties with ICT tool, ICT resources—relations = maintaining relations with the team and the manager.
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

Appendix C

TABLE C1 | Regression analyses of ICT demands and resources and job autonomy on WLB for hybrid ($n = 687$) and high-intensity ($n = 793$) teleworkers. Dependent variable = WLB.

	Likert scale	Hybrid (SE)	High-Intensity (SE)
Ictdifficulties^	1 (very rarely or never)—5 (always or very frequently)	−0.055 (0.040)	−0.045 (0.041)
Ecommun^	1 (very rarely or never)—5 (always or very frequently)	−0.345*** (0.043)	−0.303*** (0.042)
Emailsmess^	1 (very rarely or never)—5 (always or very frequently)	−0.056 (0.053)	−0.096* (0.050)
Relations^	1 (fully disagree)—5 (fully agree)	0.034 (0.041)	0.080** (0.040)
Goalsachiev^	1 (fully disagree)—5 (fully agree)	0.021 (0.045)	0.122*** (0.041)
Flexib^	1 (fully disagree)—5 (totally agree)	0.087* (0.050)	−0.031 (0.052)
Autonomy	1 (fully disagree)—5 (fully agree)	0.304*** (0.052)	0.377*** (0.050)
Gender male		0.103 (0.087)	−0.027 (0.088)
Gender N/A		0.078 (0.128)	−0.138 (0.133)
Age 25−24		−0.489** (0.219)	−0.142 (0.277)
Age 35−44		−0.473** (0.218)	−0.236 (0.278)
Age 45−54		−0.538** (0.229)	−0.207 (0.282)
Age 55−64		−0.380 (0.244)	−0.090 (0.290)
Age 65−74		−0.588 (0.373)	−0.071 (0.373)
Education: Elementary school		−0.524 (0.424)	0.259 (0.420)
Education: Secondary		−0.026 (0.115)	−0.026 (0.108)
Education: Vocational education after elementary school		−0.189 (0.660)	0.673** (0.322)
Education: Vocational education with secondary education		0.085 (0.115)	−0.041 (0.116)
Education: Master's degree		−0.002 (0.089)	−0.087 (0.085)
Education: Doctorate degree		0.404 (0.595)	−0.319 (0.324)
Occupation: Head of the organisation		−0.416 (0.331)	−0.266 (0.326)

(Continues)

TABLE C1 | (Continued)

	Likert scale	Hybrid (SE)	High-Intensity (SE)
Occupation: Head of the division or field		0.012 (0.262)	−0.244 (0.296)
Occupation: Leading specialist		−0.016 (0.234)	-0.041 (0.192)
Occupation: Project manager		−0.255 (0.258)	0.155 (0.229)
Occupation: Head of department or unit		−0.226 (0.241)	0.028 (0.207)
Occupation: Mid-level specialist		0.153 (0.226)	0.038 (0.182)
Occupation: Clerk		0.134 (0.249)	0.022 (0.217)
Occupation: Customer service representative		0.067 (0.291)	0.254 (0.248)
Occupation: Specialist technician		−0.037 (0.279)	−0.051 (0.233)
Occupation: Sales or service worker		−0.029 (0.307)	0.226 (0.253)
Occupation: Skilled or craft worker		0.111 (0.697)	−0.296 (0.552)
Occupation: Elementary worker		−0.760 (1.032)	0.579 (0.356)
Occupation: Others		−0.147 (0.331)	0.326 (0.226)
Sector: Construction		0.114 (0.244)	−0.257 (0.257)
Sector: Electricity and heat production		0.140 (0.351)	0.463 (0.386)
Sector: Mining		1.040 (0.946)	1.287*** (0.365)
Sector: Information and telecommunication technology		−0.083 (0.165)	−0.026 (0.159)
Sector: Data collection and information processing		−0.267 (0.291)	0.091 (0.208)
Sector: Environmental protection and waste management		0.155 (0.430)	0.085 (0.504)
Sector: Real estate management, maintenance and mediation		−0.320 (0.398)	−0.368 (0.431)
Sector: Finance and accounting		−0.328* (0.167)	0.029 (0.164)
Sector: Law enforcement and rescue service		−0.090 (0.402)	0.078 (0.554)
Sector: Retail and supply		0.233 (0.188)	−0.198 (0.187)
Sector: Management consultation, development		−0.238 (0.197)	0.212 (0.199)
Sector: Representative organisations and NGOs		−0.637 (0.543)	1.107* (0.668)
Sector: Art, culture, journalism and humanities		0.167 (0.302)	0.023 (0.241)
Sector: Quality and internal control		−0.163 (0.294)	0.653* (0.389)
Sector: Application of natural and technical sciences		0.114 (0.472)	0.723** (0.366)
Sector: Horeca		0.241 (0.672)	−1.629*** (0.426)
Sector: Banking and insurance		0.125 (0.214)	0.410** (0.196)
Sector: HR consultancy and services		−0.077 (0.249)	−0.181 (0.285)
Sector: Agriculture, forestry and fishing		0.414 (0.438)	0.261 (0.438)
Sector: State institutions and local government		−0.224 (0.186)	−0.124 (0.186)
Sector: Social work and care		−0.450 (0.439)	−0.432 (0.830)
Sector: Sports, travel and leisure activities		0.941** (0.473)	−0.204 (0.551)
Sector: Healthcare and medicine		−0.012 (0.370)	−0.385 (0.478)
Sector: Transport, storage and logistics		−0.273 (0.249)	0.223 (0.204)
Sector: Marketing, advertising, PR and communication		−0.142 (0.207)	0.243 (0.186)
Sector: Manufacturing		−0.053 (0.220)	0.004 (0.332)
Sector: Water supply and sewerage		−0.531 (0.689)	—
Sector: Legal services		0.229 (0.292)	0.309 (0.225)

(Continues)

TABLE C1 | (Continued)

Likert scale	Hybrid (SE)	High-Intensity (SE)
Sector: Teaching, training, etc. education	−0.637** (0.302)	−0.038 (0.320)
Sector: Others	−0.221 (0.240)	0.128 (0.256)
Observations	687	793
R2	0.271	0.266
Adjusted R2	0.197	0.202
F Statistics	3.675***	4.130***

Note: ^Indicates standardised coefficients resulting from principal axes factoring. Reference variables—sex female; age 16−24; education bachelor's degree; occupation line manager, foreman; sector assistance, administration, secretarial services.
Abbreviations: ecommun = exhausting e-communication, emailsmess = problems with e-mails and messages, flexib = providing flexibility, goalsachiev = achieving work goals, ICT demands—ictdifficulties = difficulties with ICT tools, ICT resources—relations = maintaining relations with the team and the manager.
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.