



Lonely@Work@Home? The impact of work/home demands and support on workplace loneliness during remote work

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ABSTRACT

Workplace loneliness is becoming increasingly prevalent in the fast-growing remote work environment. Remote work exposes employees to different demands and support not only at work but also at home—yet, the influences of demands and support from both work and home have not yet been investigated simultaneously in the workplace loneliness literature. In this study, we examine the role of job *and* home demands as antecedents of workplace loneliness. Based on employee wellbeing theories and social exchange theory, we predict that work/home demands will create work *and* home interference, with both mediators then increasing workplace loneliness. Moreover, we assume that both job and home support act as potential moderators to mitigate the negative effects of workplace loneliness. Using a two-wave survey of 232 remote-working employees during the coronavirus disease 2019 pandemic, we found that job demands increased workplace loneliness through heightened work-to-home interference and that this relationship was buffered by job support. Home demands increased workplace loneliness through heightened home-to-work interference, but this relationship was not buffered by home support. Our findings contribute to research and practice by identifying important drivers and remedies for loneliness in the remote workplace during the pandemic and beyond.

1. Introduction

The current times in which we live in have been declared to be an “age of loneliness” (Ozcelik & Barsade, 2018, p. 2362). The increase in loneliness is alarming because it is toxic for individuals and harms their wellbeing by fostering depression, high blood pressure, and coronary heart disease (Holt-Lunstad et al., 2015; Valtorta et al., 2016). Considering these adverse effects, a thorough understanding of how loneliness emerges is crucial. Surprisingly, even though individuals spend many hours each week at work, few studies have focused on loneliness *at work*, that is, the subjective, negative feeling that a person’s social needs are not adequately met with respect to his or her work environment (Wright & Silard, 2020). Workplace loneliness has received scarce attention from the management domain, yet this scant research has shown that workplace loneliness has serious adverse effects on employee commitment and job performance (Anand & Mishra, 2021; Ozcelik & Barsade, 2018; Wright et al., 2006). However, what drives workplace loneliness is much

less understood. In fact, scholars have called for “a more complete understanding of workplace loneliness” (Ozcelik & Barsade, 2018, p. 2362) and, in particular, for more input-process-output oriented views that examine how and why workplace loneliness arises (Wright & Silard, 2020).

The need to understand workplace loneliness is especially urgent given a related recent trend, namely, the increase in remote working sparked by the coronavirus disease 2019 (COVID-19) pandemic (e.g., Kniffin et al., 2020; Santana & Cobo, 2020). The COVID-19 pandemic has further reinforced the disheartening societal trend toward greater loneliness (Li & Wang, 2020), given the social restrictions in the private sphere and the implementation of remote work policies in the work sphere. Today, restrictions in the private sector have been lifted again, but frequent remote work—and with it, possibly, loneliness at work—has persisted in many industries (George et al., 2022). The switch to remote work may have a permanent impact on management practices and employee preferences (Anker, 2021; Kramer & Kramer, 2020; Kunze

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et al., 2020) and makes the rate of remote work likely to remain high even after the crisis. The remote setting can provide important benefits, including increased autonomy and flexibility (e.g., Adamovic et al., 2021; Côte et al., 2021), but can also have adverse effects on employee wellbeing, including overwork and negative emotions (e.g., Charalampous et al., 2018). Given that remote work inherently increases distance between employees, it is surprising that only a few studies have examined loneliness within remote work settings (see Mann et al., 2000 and Mann & Holdsworth, 2003 for exceptions). Although scholars have studied loneliness at home (Bartoszek et al., 2020; Larson, 1999) or at work (Lam & Lau, 2012; Peng et al., 2017), there is little insight about workplace loneliness when being at work and at home, which is the reality individuals are facing when working remotely from home.

The present study will develop new arguments and theory to explore this understudied phenomenon of loneliness while working from home. We introduce an integrated work-home perspective and investigate how job and home demands, as well as job and home resources, affect feelings of workplace loneliness. To achieve this, we combine theories of employee wellbeing, namely, job demands-resources (JD-R) theory (Bakker et al., 2003) and conservation of resources (COR) theory (Hobfoll & Shirom, 2001, with social exchange theory (SET) (Homans, 1961) as a central framework on social relationships. We argue that workplace loneliness can arise from job and home demands because they create energy-depleting interference, which limits an employee’s energy and willingness to establish, maintain, and develop high-quality social exchange relationships at work (cf. Luchetti et al., 2020). Specifically, we suggest that both job and home demands can create negative interference (i.e., conflicts between the work-to-home and the home-to-work domains; Montgomery et al., 2006), which affects workplace loneliness. In addition, we theorize that work support and home support may act as moderating resources that help employees deal with this interference and thereby buffer the negative effects of work/home demands on work/home interference and workplace loneliness.

We strive to contribute to the literature in three main ways. First, contributing to the scarce workplace loneliness literature, we take up the call of Ozcelik and Barsade (2018, p. 2361) to study in more depth how

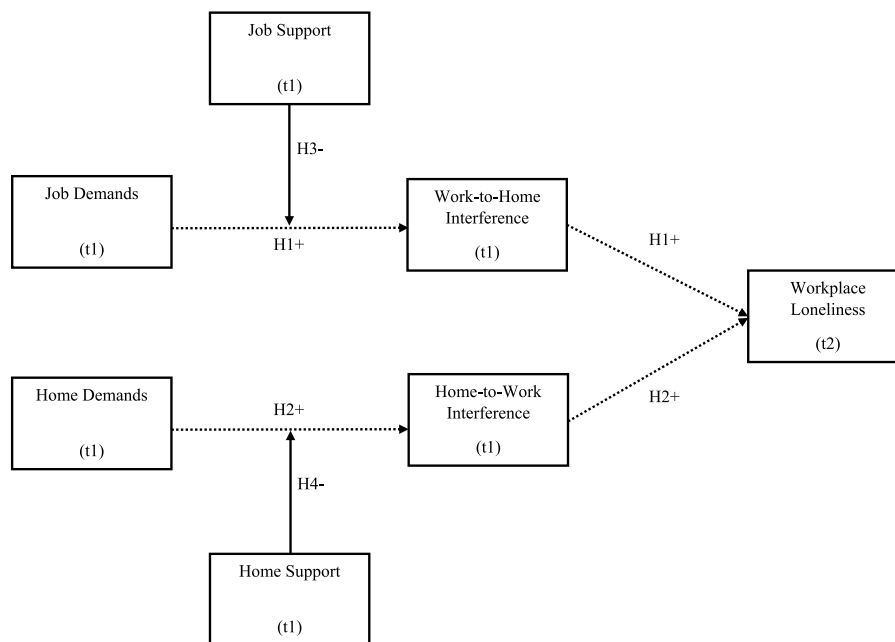
to “help employees alleviate their feelings of workplace loneliness” and identify new antecedents, mediators, and moderators of workplace loneliness. Our study adds to the limited empirical evidence on this topic and expands contemporary theorizing by taking a dual work-home perspective in which energy depletion and social exchanges can affect workplace loneliness (Wright & Silard, 2020). Second, we contribute by answering the call of Charalampous et al. (2018) to explore concrete processes underlying employee wellbeing in home and remote working settings. We do so by theorizing that interference can deplete employees’ energy and willingness to engage in social exchanges in both work and home settings and thus increase their workplace loneliness. Third, our incorporation of job and home support as possible energy-regenerative moderators further adds to these insights by showing that the mediation process might be contingent on the specific work and home contexts that employees face.

By considering both demands and supportive factors associated with working from home, we aim to create a more unified perspective on the dual-faced nature of remote work. Our work is an attempt to help both scholars and management practitioners better understand “which occupational and individual characteristics are associated with work-from-home effectiveness” (Kramer & Kramer, 2020, p. 3) and ultimately create better business and management policies and practices when dealing with this current increase in workplace loneliness. Fig. 1 summarizes our research model.

2. Theory and hypotheses

2.1. Workplace loneliness in the remote work setting

Workplace loneliness is a relatively new concept that has gained attention in recent years (Peng et al., 2017). Following the study by Wright and Silard (2020), we consider workplace loneliness to be a negative feeling that arises when there is a mismatch between desired and actual relationships at work. Previous studies have linked workplace loneliness to various negative work-related outcomes, including decreased employee approachability, organizational commitment, and job performance (Ozcelik & Barsade, 2018). To prevent these various



Note: t1 = first data collection point, t2 = one week later

Fig. 1. Research model.

negative consequences, it is especially important to understand how and why workplace loneliness arises. This study, therefore, examines the antecedents of workplace loneliness and their interrelationships.

Workplace loneliness may be particularly prevalent in remote work settings (also referred to as telecommuting or telework, e.g., [Vanderstukken et al., 2021](#)). Remote work is widespread and was rapidly advancing even before the COVID-19 pandemic ([Charalampous et al., 2018](#); [Colbert et al., 2016](#)), yet it is expected to expand even further after the pandemic ([Kunze et al., 2020](#)). In this study, we understand remote work as working from home with the aid of information and communications technology ([Donnelly & Johns, 2021](#); [Grant et al., 2013](#)). Notably, some other studies have defined remote work more broadly to include any work done away from a primary office location ([Perry et al., 2018](#)). We follow prior studies that focused on working from the home environment because this is one of the most common remote work locations ([Di Martino & Wirth, 1990](#)), especially since the COVID-19 pandemic began ([Kramer & Kramer, 2020](#)). Collectively, remote work appears to have mixed consequences for employees' wellbeing ([Charalampous et al., 2018](#)), including higher autonomy and flexibility on the positive side ([Gajendran & Harrison, 2007](#); [Mazmanian et al., 2013](#); [Redman et al., 2009](#)) and overwork and negative emotions on the negative side ([Chesley & Johnson, 2014](#); [Tietze & Musson, 2005](#)).

Workplace loneliness is still largely overlooked as a phenomenon during remote work. This is surprising because the setting of remote work seems prone to lead to loneliness. Specifically, physical separation and reduced communication during remote work might hinder satisfying interactions with coworkers and lead to feelings of loneliness ([Lautsch et al., 2009](#); [Waizenegger et al., 2020](#)). Lack of face-to-face communication with coworkers might also create ambiguities and misunderstandings because of missing nonverbal cues ([Zuckerman et al., 1975](#)). This may increase employees' concerns regarding interpersonal rejection by others and trigger loneliness ([Cacioppo et al., 2006](#); [Ozcelik et al., 2020](#)). Moreover, less frequent or intense interactions with colleagues might limit access to social and personal resources, further contributing to workplace loneliness ([Xanthopoulou et al., 2009](#)). Picking up on these considerations, in this study, we aim to systematically examine which factors in the remote work environment drive workplace loneliness and why. To explore the process leading to workplace loneliness, we combine theories on employee wellbeing with SET.

2.2. Theoretical background: wellbeing theories and social exchange theory

This study examines the drivers of workplace loneliness in a remote work setting. We posit that job demands can create work-to-home interference, and simultaneously, home demands can create home-to-work interference. Consequently, both types of interference are expected to increase workplace loneliness. Furthermore, we suggest that these negative effects are buffered by job and home resources.

To understand loneliness in the remote work setting, we will use two related theories of employee wellbeing together with SET. These two wellbeing theories are the JD-R theory ([Bakker et al., 2003](#)) and the COR theory ([Hobfoll & Shirom, 2001](#)). COR theory mainly explains how individuals maintain and accumulate their psychological resources ([Hobfoll & Shirom, 2001](#)). JD-R theory builds on COR theory ([Bakker et al., 2022](#)) and further explains how demands versus resources in the work setting erode versus rebuild employees' psychological resources. The two theories share a common underlying theoretical ground and have been used together to explain workplace phenomena ([Bakker et al., 2022](#); [Van Woerkom et al., 2016](#)). SET ([Homans, 1961](#)) theorizes that any kind of social relationship is fundamentally an exchange relationship that is characterized by mutual give-and-take or, stated differently, by costs/benefits or investments/returns ([Cropanzano & Mitchell, 2005](#)).

In transferring these wellbeing theories together with SET to the

setting of remote work, we will explain why the burdens of job and home demands during remote work can create work-to-home and home-to-work interference. Drawing from COR, we expect that this interference refers to strenuous states in which individuals experience that job-related issues interfere with their home lives (work-to-home interference) or vice versa (home-to-work interference). The SET model in conjunction with JD-R will also help explain the role that job and home resources have in mitigating these harmful effects. Taken together, to explain workplace loneliness in a remote work setting, we will first link job and home demands to interference with the help of JD-R and COR theory. Subsequently, we will link interference with workplace loneliness using SET.

2.3. Linking job and home demands to interference between work and home

A core tenet of both JD-R ([Bakker et al., 2003](#)) and COR theories ([Hobfoll & Shirom, 2001](#)) is that the amount of energy that employees have available during each working day is limited ([Bakker et al., 2022](#)). This includes limited physical energy (e.g., investing time for being at—and participating in—communications and meetings), limited cognitive energy (e.g., paying attention during interactions, providing feedback), and limited emotional energy (e.g., capacity for being empathic toward others or helping others) ([Methot et al., 2017](#)). According to the JD-R model, employees' limited energy resources can be depleted by job demands, that is, challenging aspects of work (e.g., work overload, emotional demands) that require sustained mental or physical effort from employees ([Bakker et al., 2022](#)).

Extending the JD-R model to the remote work setting, the special challenge of working from home lies in the simultaneous presence of job-related and home-related demands. Remote work blurs the boundaries between professional and private activities ([Grant et al., 2013](#)). Employees' work roles become intensively intertwined with their home roles, both physically and psychologically ([Eddleston & Mulki, 2015](#)). Thus, during remote work, demands from the job domain and the home domain co-occur and compete in parallel for employees' limited energy resources (cf., [Brummelhuis & Bakker, 2012](#); [O'Driscoll et al., 1992](#)).

We suggest that the burdens of job and home demands during remote work will give rise to negative interference between the home domain and the work domain ([Montgomery et al., 2006](#); [O'Driscoll et al., 1992](#)). As the key mechanisms underlying the link between job and home demands and workplace loneliness, we introduce two types of interference, that is, work-to-home interference (where job demands conflict with the home domain) and home-to-work interference (where home demands conflict with the job domain; [Bakker & Geurts, 2004](#); [Frone et al., 1992](#)).

Job demands and home demands may create interference between the work and home domains in three main ways ([Greenhaus & Beutell, 1985](#)). First, demands may lead to time-based interference, such that the time spent dealing with job demands cannot be devoted to dealing with home demands and vice versa, such as not having enough time to spend with spouses, other family members, or work colleagues. Second, demands may lead to strain-based interference, such that stress from dealing with job demands “spills over” to the home domain, making it difficult to handle home obligations, and vice versa, such as having difficulties relaxing at home or engaging in productive work (cf. [Gardner et al., 2021](#)). Third, demands may create behavior-based interference, such that specific patterns of behavior in the work domain (e.g., being assertive and objective) are incompatible with the behavior needed in the home domain (e.g., being warm and emotional), and vice versa, such as being irritable because of work stress and letting frustration out on team members.

Following this argumentation, we suggest that job demands during remote work will increase work-to-home interference. Job demands during remote work may be exceptionally high because of increased physical distance, decreased communication richness, and limited access to psychological and social support systems ([Lautsch et al., 2009](#);

Xanthopoulou et al., 2009). Moreover, remote work often creates an “always on” culture where individuals feel obliged to be constantly available (Derks et al., 2014). Altogether, these job demands may spill over physically and psychologically into the home domain, keeping employees occupied with work while at home (Brummelhuis & Bakker, 2012; Dittes et al., 2019; Eddleston & Mulki, 2015). Having to deal with these job demands will take up time and create strain, making it difficult to engage with the home domain, thereby creating interference.

Similarly, we suggest that home demands during remote work will increase home-to-work interference. Home demands during remote work, such as household and parenting responsibilities, likely drain emotional and mental resources that are also needed in the work setting (Brough & O’driscoll, 2010; Powell & Greenhaus, 2009). Increased home demands will also take up time and create strain, making it difficult to meet work requirements (Greenhaus & Kossek, 2014; Kreiner, 2006; Peeters et al., 2005; Walumbwa et al., 2021). In addition, when working from home, the aforementioned “always on” culture likely applies to private life as well, with employees being particularly vulnerable to requests from friends and family, whether via face-to-face or online interactions (Nowland et al., 2017). Hence, we argue that just as job demands can generate work-to-home interference, home demands may generate home-to-work interference.

2.4. Linking interference between work and home to workplace loneliness

We argue that the two types of interference created by job and home demands will impair employees’ ability to engage in social relationships, leading to greater feelings of workplace loneliness. Following JD-R and COR theories, building and maintaining social relationships at work may become increasingly difficult if job and home demands create more work-to-home or home-to-work interference. With more interference, employees will have fewer behavioral, emotional, and mental resources to invest in social exchange relationships at work (Bakker et al., 2003, 2004, 2022). In this situation, individuals will try to maintain and protect their valuable yet limited psychological resources (Hobfoll & Shirom, 2001) be forced to make trade-offs in the use of their already-reduced resources during their workday. To conserve their limited resources, it is likely that employees will restrict themselves only to the most necessary contacts and social exchanges at work. Supporting this, prior research shows that, in a state of interference and energy depletion, individuals try to protect their resources against further loss by withdrawing and distancing themselves from others (Cropanzano et al., 2003; Taris et al., 2001), becoming more self-centered (Mok & De Cremer, 2018), and less helpful toward others (DeWall et al., 2008).

Regarding SET, engaging in social relationships with others can involve uncertainties and risks (Blau, 1964). In particular, social relationships require each individual to “do their part” to maintain an appropriate level of reciprocity. If the reciprocity gets out of balance—because one person gives too little—the other person might withdraw and abandon the relationship (Cropanzano et al., 2017). This is also the case in the workplace setting because building and maintaining high-quality social relationships in organizations requires giving considerable energy, attention, and time to them (May et al., 2004; Methot et al., 2017; Wright & Silard, 2020). Accordingly, when in a state of interference, individuals will reduce the inputs they invest in social exchange relationships.

Thereby, interference will prevent employees from intensively engaging in deep, meaningful, and satisfying work relationships that go beyond what is necessary to stay on task. This may go along with a feeling that social needs are not adequately met, that is, loneliness. In addition, the reduced input into social exchange increases the risk that the employee will be left alone by coworkers or supervisors who perceive an imbalance in the give-and-take relationship and therefore reduce their investment (e.g., time, attention, devotion, and so forth) in the social exchange relationship (Borawski, 2018; Rook, 1987). In short, work/home interference will limit behavioral, emotional, and mental

resources, which will make it difficult for employees to contribute their part to social exchange relationships at work, and in turn, will create less social interaction and a higher chance of people feeling lonely. Thus, we hypothesize that.

Hypothesis 1. The relationship between job demands and workplace loneliness will be mediated by work-to-home interference, such that job demands will increase work-to-home interference, which will consequently increase workplace loneliness.

Hypothesis 2. The relationship between home demands and workplace loneliness will be mediated by home-to-work interference, such that home demands will increase home-to-work interference, which will consequently increase workplace loneliness.

2.5. The buffering role of job and home support

On the positive side, the JD-R model also theorizes about job resources, that is, supportive aspects of a job (e.g., good team atmosphere, role clarity) that lead to positive outcomes such as work engagement and perceived meaningfulness (Canboy et al., 2023; Wu et al., in press; Schaufeli, 2017). It has been shown that job support can alleviate some of the negative effects that job demands have on personal resources and energy (cf. Brough & O’driscoll, 2010; O’driscoll et al., 1992; Lesener et al., 2018; Methot et al., 2017). Forms of job support, such as supportive leadership, culture, colleagues, and policies such as flexible work arrangements, have also been found to improve work-life balance and reduce stress (Brough & O’driscoll, 2010; Canboy et al., 2023). The upside of the remote setting is that, in addition to the double burden of demands, it also allows for the simultaneous presence of job-related and home-related resources. We argue that home support should similarly buffer some of the adverse effects that home demands have on personal resources because private-life stressors are reduced, and energy can either be protected or regenerated (cf. Brough & O’driscoll, 2010; Grzywacz & Marks, 2000; Greenhaus & Beutell, 1985; Hobfoll & Shirom, 2001). Both home and job support should weaken the interference from the respective domain (work-to-home or home-to-work) because of a reduction in stressors and minimization in the depletion of mental resources and physical, cognitive, and emotional energy (Methot et al., 2017). This is supported by the findings of Grzywacz and Marks (2000), who observed less negative spillover when employees experienced high resources, such as emotionally close family relations on the home side and more decision latitude on the work side. A similar concept is work-family enrichment, where feelings of support from one domain can help individuals to cope better and be more efficient with their resources in the respective other domain (Greenhaus & Powell, 2006). Hence, support for our theorizing comes not only from the JD-R literature (Bakker et al., 2022), but also from the adjacent literature, such as work-family enrichment (Chan et al., 2019).

Taken together, based on the JD-R theory (Bakker & Geurts, 2004), we expect that a higher level of resources can buffer interference. Employees with more behavioral, emotional, and cognitive resources will be better able to engage in social relationships with coworkers and other work-related social contacts. Viewed from a SET perspective (Homans, 1961), employees who experience less interference will be more likely to “do their part” in social exchange relationships with others. In turn, they are also likely to receive more time, attention, and devotion back from the other individuals. In the words of the COR theory (Hobfoll & Shirom, 2001), a gain spiral would then take place, which creates more and more valuable social interaction and a lower likelihood of people feeling lonely. Thus, we hypothesize that.

Hypothesis 3. The indirect relationship between job demands and workplace loneliness, mediated by work-to-home interference, will be moderated by job support, such that for higher levels of job support, the relationship will be weaker

Hypothesis 4. The indirect relationship between home demands and workplace loneliness, mediated by home-to-work interference, will be moderated by home support, such that for higher levels of home support, the relationship will be weaker.

3. Method

3.1. Sample and procedure

We conducted a two-wave study among employees working from home during the COVID-19 pandemic in May 2020. Akin to other studies (e.g., Kaluza et al., 2021), we used a 1-week time split (i.e., first wave: early May 2020; second wave: 1 week later). We collected data via *respondi*, a well-established German panel service. Recruitment e-mails were sent to 964 panel-registered “white-collar” working individuals in Germany from various sectors, such as banking, logistics, and telecommunication. Employees were given a small commission via *respondi* for the completion of the survey. We assured respondents that their participation was voluntary, confidential, and according to the strict ethical standards of the University. For wave one, 964 individuals accessed the survey, of whom 266 also accessed the second wave survey. To identify employees working from home, we used a screening item asking participants how much time they currently spend working from home. Only participants who spent 50% or more of their time working from home at the time of the survey were included in the study, following the cutoff value used by Konradt et al. (2003).

The survey yielded $n = 337$ valid responses (response rate = 34.96%) for the first wave and $n = 245$ valid responses (retention rate = 72.70%) for the second wave. Thirteen participants were excluded because of missing data, yielding a final of $n = 232$. The average age of the respondents was 43.07 ($SD = 10.71$) years, and 46.46% of them were women. The average team size was 18.23 ($SD = 35.56$) and the mean tenure was 11.23 ($SD = 9.56$) years. The average working hours per week were 38.48 ($SD = 7.40$), whereas the average proportion of time spent working from home was around 89.23% ($SD = 17.29$).¹

We tested the hypotheses using a bootstrapping approach with the PROCESS macro for SPSS (Hayes, 2018). This tool enabled us to analyze both the mediation effect (using the model 4 template) and the moderation and moderated mediation effects (using the model 7 template).

3.2. Measures

All measurement scales were 5-point Likert-type scales ranging from 1 to 5. We used existing international scales that have been previously translated into German. The independent and dependent variables were temporally split to reduce concerns about common method variance (Podsakoff et al., 2003); therefore, most variables were measured at t1, whereas workplace loneliness was measured at t2.

Job and home demands. The work-family conflict scale introduced by Boyar et al. (2007) covers demands emerging from both the job domain and the home domain. To capture job demands, we used the five items of the subdimension “perceived work demands.” An example item is “My work requires a lot from me” (1 = strongly disagree; 5 = strongly agree). Cronbach’s α was .91. The four items of the subdimension “family demands” by Boyar et al. (2007) of the work-family conflict scale were used to assess home demands. We modified the scale to include all home relationships (not only those with relatives). An example item is “My

¹ Respondents were also asked about their communication methods (e-mail, chat, phone, and video), and 100% of respondents used a mix of these methods. Participants stated that they used e-mails on an average 40.96% of the time ($SD = 25.35$), chat and instant messaging 17.02% ($SD = 20.28$), % ($SD = 20.24$), and video chat 17.49% ($SD = 21.31$) in their communication. These numbers confirm that respondents worked mostly from home with the help of ICT.

home requires all of my attention” (1 = strongly disagree; 5 = strongly agree). Cronbach’s α was .85. An exploratory factor analysis (EFA) of both types of demands revealed two factors and no major cross-loadings, providing support for the uniqueness of job and home demands.

Job and home support. Zimet et al.’s (1988) four-item social support scale was used to assess job and home support. For job support, we broadened the wording of the original scale to not only include support from coworkers, but also from leaders and general work colleagues. An example item is “I can talk about my problems with my team members/leaders/work colleagues” (1 = strongly disagree; 5 = strongly agree). Cronbach’s α was .87. To assess home support, we adapted the scale to include the support received from household members (instead of team members). An example item is “My household members are willing to help me make decisions” (1 = strongly disagree; 5 = strongly agree). Cronbach’s α was .85. An EFA for both types of support supported the two-dimensional structure.

Interference between work and home. Geurts et al.’s (2003) four-item scale for work interference was used to assess both work-to-home and home-to-work interference. An example item for work-to-home interference is “How often does it happen that your work obligations make it difficult for you to feel relaxed at home?” (1 = never; 5 = all the time). Cronbach’s α was .90. An example item for home-to-work interference is “How often does it happen that you have difficulty concentrating on your work because you are preoccupied with domestic matters?” (1 = never; 5 = all the time). Cronbach’s α was .89. The EFA for both types of interference resulted in two factors with no major cross-loadings, thus supporting the two separate constructs.

Workplace loneliness. Wu and Yao’s (2008) eight-item loneliness at work scale, which is an updated version of Russell et al.’s (1980) UCLA (University of California, Los Angeles) workplace loneliness scale, was used to assess workplace loneliness. An example item is “I lack companionship at work” (1 = never; 5 = all the time). Cronbach’s α was .73.

Control variables. Age and gender were included as control variables, because these demographic factors have been related to loneliness in prior research (Yang & Victor, 2011). We also controlled for team size, relationship status, remote working experience, remote working frequency, and duration of remote work. The rationale for including personal relationship controls was that general life loneliness has been previously negatively associated with high-commitment relationships (Bucher et al., 2018). Variables such as remote experience and duration of remote work were included because respondents might learn over time how to deal with the unique work environment at home, possibly influencing their levels of loneliness.

3.3. Construct reliability and validity and common method variance

To check for common method variance and the reliability and validity of the scales, we conducted several tests.² First, composite reliability, which measures internal reliability, was well above the recommended level of $> .70$ for all measures (Fornell & Larcker, 1981). Second, discriminant validity was checked by comparing the average variance extracted for each latent variable with any of the bivariate correlations involving these latent variables (Fornell & Larcker, 1981). Any correlation between constructs (ranging from .07 to .59) was smaller than any square root of the average variance extracted (ranging from .64 to .90). As such, discriminant validity was considered to be good. Third, to check for convergent and discriminant validity, we ran a confirmatory factor analysis (CFA) in which all items loaded on their respective study constructs. The fit of the model was satisfactory ($\chi^2 = 837.05$, $p < .01$, CFI = .93, TLI = .92, RMSEA = .06). We performed several alternative CFAs, where we collapsed the interference variables, demand variables, and support variables into one factor each. As

² All detailed results are available from the authors upon request.

another test, we also collapsed related constructs (such as interference and demands). All fit indices were worse for the models with collapsed dimensions than for our original measurement model. Finally, to check for common method variance, we compared our measurement model versus a single-factor model ($\chi^2 = 3679.24, p < .01, CFI = .35, TLI = .30, RMSEA = .17$). Because this single factor performed worse, we conclude that common method variance was not an issue.

4. Results

4.1. Descriptive statistics

Descriptive statistics and correlations among the relevant study variables are shown in Table 1.

4.2. Test of hypotheses

First, we tested the mediating effect of work-to-home interference in the relationship between job demands and workplace loneliness during remote work, as stated in Hypothesis 1. As shown in Table 2, we found that job demands were positively associated with work-to-home interference ($B = .49, p < .001$), and work-to-home interference was positively associated with workplace loneliness ($B = .25, p < .001$). The direct effect of job demands on workplace loneliness was not significant. As hypothesized, we found a significant indirect effect of job demands on workplace loneliness via work-to-home interference (effect = .12; 95% CI [0.05; .20]) and thus support for Hypothesis 1.

Hypothesis 2 stated that home-to-work interference would mediate the relationship between home demands and workplace loneliness during remote work. As shown in Table 3, we found that home demands were positively associated with home-to-work interference ($B = .32, p < .001$), and home-to-work interference was positively associated with workplace loneliness ($B = .16, p < .05$). The direct effect of home demands on workplace loneliness was not significant. As hypothesized, we found a significant indirect effect of home demands on workplace loneliness via home-to-work interference (effect = .05, 95% CI [0.01; .10]). These results indicate a mediating effect and support Hypothesis 2.

Hypothesis 3 stated that job support would moderate the indirect relationship between job demands and workplace loneliness, mediated by work-to-home interference. As displayed in Table 4, we found a significant negative interaction effect between job demands and job support ($B = -.20, p < .05$). In addition, we used Hayes' index of moderated mediation to directly test significance for our moderated mediation hypothesis (Hayes, 2018). The index was also significant (index = -0.05 ; 95% CI [-0.10 ; -0.01]), providing further support for Hypothesis 3. Conditional indirect effects can also be seen in Table 4. The indirect effect of job demands via work-to-home interference on workplace loneliness is stronger for employees with low ($-1SD$) levels of job support ($B = .15$; 95% CI [0.06; .26]) than for employees with high ($+1SD$) levels of job support ($B = .08$; 95% CI [0.02; .16]). In Fig. 2, we plotted the interaction effect for the moderating effect of job support on the relationship between job demands and work-to-home interference. The figure shows that the slope for low job support is steeper than the slope for high job support, demonstrating that work-to-home interference increases more for individuals with low job support than for those with high job support when being subjected to high job demands.

Hypothesis 4 stated that home support would moderate the indirect relationship between home demands and workplace loneliness, mediated by home-to-work interference. As indicated in Table 5, we did not find a significant interaction effect between home demands and home support ($B = .03, n.s.$). Hayes' index of moderated mediation was also not significant (index = .00, 95% CI [-0.01 ; .02]), and there was thus no support for Hypothesis 4.

Table 1
Means, standard deviations, and correlations among study variables.

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Age	43.07	10.71													
2 Sex	.46	.50	-.04												
3 Remote Working Experience	2.97	1.86	.00	-.09											
4 Remote Working Frequency	89.23	17.29	.01	-.03	.03										
5 Duration of Remote Work	7.53	9.98	-.05	.03	.20**	.04									
6 Relationship Status	.29	.46	.06	-.04	-.05	.05	.05								
7 Team Size	18.23	35.56	-.07	.02	.04	-.09	.05	-.07							
8 Work Home Interference	2.42	.96	-.12*	.03	.11*	-.01	.07	.07	.09						
9 Home Work Interference	1.89	.83	-.25**	.05	.13*	-.01	.08	.08	.02	.59**					
10 Job Demands	3.67	.84	.00	-.09	.05	-.03	.02	.06	.19**	.54**	.18**				
11 Job Support	3.79	.75	.01	-.01	.07	.07	-.09	-.06	.11**	-.19**	-.22**	.06			
12 Home Demands	2.76	.98	-.13**	.00	.06	-.03	.00	-.09	.16**	.52**	.58**	.32**	-.07		
13 Home Support	3.93	.87	.00	-.04	-.02	.03	-.14*	-.31**	-.05	-.27**	-.30**	-.08	-.33**	-.20**	
14 Workplace Loneliness	2.34	.68	-.08	.00	-.02	.06	.03	.15*	.03	.37**	.35**	.05	-.24**	.19**	-.24**

Note: n = 232, *p < .05, **p < .01; relationship status: single = 1; gender: female = 1.

Table 2
Results of mediation analysis for Hypothesis 1.

Model	Variable	Work-to-Home Interference		Workplace Loneliness		
		B	SE	B	SE	
1	Control variables	Age	-.00	.01	.00	.00
		Gender	.09	.03	-.05	.09
		Remote Working Experience	.02	.03	-.02	.02
		Remote Working Frequency	-.00	.00	.00	.00
		Duration of Remote Work	.00	.01	.00	.01
		Relationship Status	.14	.10	.10	.09
		Team Size	-.00	.00	.00	.00
		Home-to-Work Interference	.50***	.07	.16*	.07
		Home Demands	.15*	.06	-.03	.06
2	Independent	Job Demands	.49***	.06	-.12†	.07
3	Mediator	Work-to-Home Interference	-	-	.25***	.06
R ²			.52***		.19***	

Bootstrapping Results

Direct effect = -.12; S.E. = .07; T-test = -1.78; n.s.

Variable	Indirect Effect	Boot SE	Lower CI	Upper CI
Work Home In.	.12	.04	.05	.20

Note: n = 232; ***p < .001; **p < .01; *p < .05; †p < .10; number of bootstraps, 5000; confidence intervals 95%; gender: female = 1, relationship status: single = 1.

Table 3
Results of mediation analysis for Hypothesis 2.

Model	Variable	Home-to-Work Interference		Workplace Loneliness		
		B	SE	B	SE	
1	Control variables	Age	-.01**	.00	.00	.00
		Gender	.07	.08	-.05	.09
		Remote Working Experience	.03	.02	-.02	.02
		Remote Working Frequency	.01	.00	.00	.00
		Duration of Remote Work	.01	.01	.00	.01
		Relationship Status	.25**	.08	.10	.09
		Team Size	-.00	.00	.00	.00
		Work-to-Home Interference	.36***	.05	.25***	.06
		Job Demands	-.22***	.06	-.12†	.07
		2	Independent	Home Demands	.32***	.05
3	Mediator	Home-to-Work Interference	-	-	.16*	.07
R ²			.50***		.19***	

Bootstrapping Results

Direct effect = -.03; S.E. = .06; T-test = -.45; n.s.

Variable	Indirect Effect	Boot SE	Lower CI	Upper CI
Home Work In	.05	.03	.01	.10

Note: n = 232; ***p < .001; **p < .01; *p < .05; †p < .10; number of bootstraps, 5000; confidence intervals 95%; gender: female = 1, relationship status: single = 1.

4.3. Alternative model tests

We also performed several robustness and alternative model tests. First, we tested whether our findings might have been affected by the choice and inclusion of certain control variables. We, therefore, re-ran our models one time with only demographic controls (e.g., gender)

and another time with only job-related and home-related control variables (e.g., remote work experience). All findings were comparable to the findings reported above. Second, we tested for possible alternative mediation mechanisms. Switching antecedents (i.e., job demands) with the mediators (i.e., job interference) yielded no significant indirect effects. Third, we tested for possible alternative moderation mechanisms.

Table 4
Results of moderated mediation analysis for Hypothesis 3.

Model	Variable	Work-to-Home Interference		Workplace Loneliness		
		B	SE	B	SE	
1	Control variables	Age	-.01	.00	.00	.00
		Gender	.01	.09	-.10	.09
		Remote Working Experience	.03	.03	-.02	.02
		Remote Working Frequency	-.00	.00	.00	.00
		Duration of Remote Work	.00	.01	.00	.01
		Relationship Status	.04	.10	.08	.10
		Team Size	.00	.00	.00	.00
		Home-to-Work Interference	.43***	.07	.14*	.08
		Home Demands	.15*	.06	-.03	.06
		Home Support	-.11†	.06	-.06	.05
		Job Support	-.14*	.07	-	-
2	Independent	Job Demands	.24***	.10	-.11	.07
3	Mediator	Work-to-Home Interference	-	-	.23***	.06
4	Interaction	Job Demands*Job Support	-.20*	.08	-	-
R ²			.56***		.12***	

Bootstrapping Results

Direct effect = -.11; S.E. = .06; T-test = -1.61; n.s

SD	Indirect Effect	Boot SE	Lower CI	Upper CI
-1SD	.15	.05	.06	.26
M	.12	.04	.04	.20
+1SD	.08	.04	.02	.16

Index of Moderated Mediation = -.05; Boot S.E. = .03; Lower CI = -.10; Upper CI = -.01

Note: n = 232; ***p < .001; **p < .01; *p < .05; †p < .10; number of bootstraps, 5000; confidence intervals 95%; gender: female = 1, relationship status: single = 1.

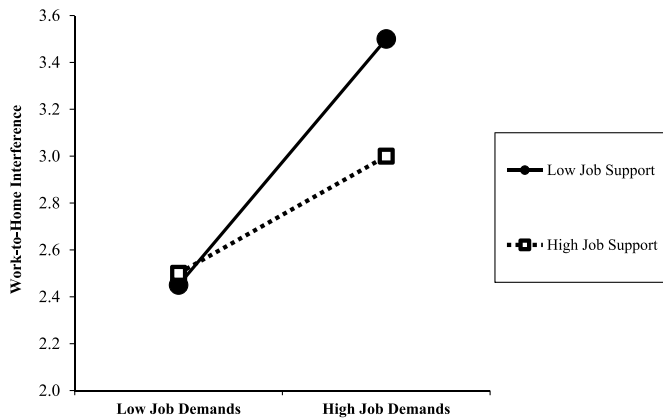


Fig. 2. Interaction plot for the moderating effect of job support on the relationship between job demands and work-to-home interference.

Switching moderators gave no significant results for home support but gave significant results for job support (on the relationship between home demands—home-to-work interference—workplace loneliness), showing the importance of job support in possibly even alleviating demands from home.

5. Discussion

The present study shows that demands from both the work and home environment create interference (work-to-home and home-to-work) and that these two types of interference in turn increase workplace loneliness. Job resources alleviate the negative impact of job demands, hence reducing interference and loneliness. Job resources can thus help

employees in reducing work-life conflicts (Brough & O’driscoll, 2010), which leaves more energy that can be used for engaging in social relationships and can thus reduce workplace loneliness.

Contrary to our hypothesis, we did not find a significant moderation effect of home resources on the relationship between home demands and home-to-work interference. Correlational analyses, however, show that home support is negatively correlated with both home demands and job demands, and also negatively correlated with both home-to-work interference and work-to-home interference. It is thus probable that support from the home environment (i.e., from family members, partners, relatives, or friends) still has a beneficial impact in reducing interference and even workplace loneliness during remote work. Alternative model tests showed that job support, on the other hand, also negatively moderated the relationship between home demands, home-to-work interference, and workplace loneliness, suggesting that job support may help alleviate demands and ultimately workplace loneliness even from the home side. This shows the potential importance of different types of job support systems, such as management programs that support employee wellbeing (Kowalski & Loretto, 2017).

5.1. Theoretical implications

The present study sheds light on workplace loneliness during remote work and makes at least three theoretical contributions. First, we advance the emerging stream of research on workplace loneliness, because thus far “there has been very little examination of the processes and outcomes of loneliness in the workplace, even though most people spend a large part of their lives at work” (Ozcelik & Barsade, 2018: 2343). Our study shows the importance of job demands in increasing workplace loneliness. We also add to the limited research on antecedents of workplace loneliness (Wright & Silard, 2020) and use the employee

Table 5
Results of moderated mediation analysis for Hypothesis 4.

Model	Variable	Home-to-Work Interference		Workplace Loneliness		
		B	SE	B	SE	
1	Control variables	Age	-.01**	.00	.00	.00
		Gender	.07	.08	-.49	.09
		Remote Working Experience	.03	.02	-.02	.02
		Remote Working Frequency	.00	.00	.00	.00
		Duration of Remote Work	.00	.01	-.00	.01
		Relationship Status	.19**	.09	.10	.09
		Team Size	-.00	.00	.00	.00
		Work-to-Home Interference	.32***	.06	.22***	.06
		Job Demands	-.19**	.06	-.09	.07
		Job Support	-.07	.06	-.06†	.06
		Home Support	-.09†	.05	-	-
2	Independent	Home Demands	.31***	.05	-.01	.06
3	Mediator	Home-to-Work Interference	-	-	.14†	.07
4	Interaction	Home Demands*Home Support	.03	.04	-	-
R ²			.51***		.21***	
Bootstrapping Results						
Direct effect = -.01; S.E. = .06; T-test = -.23; n.s						
SD	Indirect Effect	Boot SE	Lower CI	Upper CI		
-1SD	.04	.02	.00	-.09		
M	.04	.02	.00	.09		
+1SD	.05	.03	.00	.10		
Index of Moderated Mediation = .00; Boot S.E. = .01; Lower CI = -.01; Upper CI = .02						

Note: n = 232; ***p < .001; **p < .01; *p < .05; †p < .10; number of bootstraps, 5000; confidence intervals 95%; gender: female = 1, relationship status: single = 1.

wellbeing literature to introduce a theory-based, practical, and process-like model that contributes to the understanding of the emergence of workplace loneliness. We bring a new perspective to the workplace loneliness literature by emphasizing that employees often cannot just simply engage in social relationships because they have limited mental resources. These resources need to be distributed among various tasks and relationships and this can create interference, especially in a challenging remote work environment. Although other studies have identified emotional exhaustion as a consequence of workplace loneliness (Anand & Mishra, 2021), our theory and findings suggest that it might also be an antecedent because exhausted resources prevent employees from engaging in social relationships.

Second, we advance the remote work literature by deliberately adding a home dimension to workplace loneliness, which has been mostly lacking in research in this field (Charalampous et al., 2018). Our study shows that home demands negatively influence workplace loneliness via home-to-work interference. It is thus important to include the home environment when assessing workplace loneliness in a remote work setting to understand workplace loneliness and developing interventions for reducing it.

Third, we expand the current workplace loneliness literature to the remote work environment, an area that has been gaining importance recently (Kramer & Kramer, 2020). In showing that the home environment can influence workplace loneliness, we add to the workplace loneliness literature, which is still largely in its infancy (Peng et al., 2017). The implications of this research go beyond the current COVID-19 pandemic because a large proportion of remote work is likely to continue afterwards as the “new normal” (George et al., 2022; Kniffin et al., 2020). The underlying process of resource and energy depletion caused by workplace demands leading to workplace loneliness is likely

to continue playing a role in the post-pandemic work environment (Kunze et al., 2020).

5.2. Strengths, limitations, and future research

Our research has several strengths as well as some limitations. First, although we used two waves of data collection and split the dependent variable from the independent variable to reduce concerns about common method variance (Podsakoff et al., 2003), reverse causality cannot be completely ruled out. For instance, theoretically, it could have been possible that employees might feel lonely at work and view this as some form of job demand or lack of job resources. However, this is unlikely in our study, as workplace loneliness was measured at a later point in time (t2) than job demands and resources (t1). In addition, robustness checks showed no significant reverse mediation, making alternative explanations less likely. Still, future research might conduct experimental designs or longitudinal studies with more waves and longer time spans to explore our theory and findings in more depth. For example, it might be possible that after a certain period of remote work, employees start to actively restore their limited resources by seeking and intensifying social interaction with their colleagues (Hobfoll et al., 2018). This might be particularly the case for employees with certain traits such as high resilience (Liu et al., 2019), or certain mindsets such as pro-active mindsets (Meijerink et al., 2020).

Second, using *respondi*, a well-established panel service, we obtained reliable employee data from diverse industries and backgrounds. However, future research might also focus on specific companies and their particular HR policies to investigate workplace loneliness on a more practical level.

Third, we used well-established wellbeing theories to argue that job

and home demands create interference by draining physical and mental resources. As in most other research in the employee wellbeing literature (Hobfoll et al., 2018), we captured the energy depletion processes somewhat indirectly. Future research could try to further investigate the exact processes (e.g., time-, strain-, and/or behavior-based; Greenhaus & Beutell, 1985) that underlie interference and energy depletion. This may allow future research to develop targeted interventions. For example, time-based interference might be managed via HR practices focused on workload and time management (Otterbach et al., 2021). Strain-based interference could be managed by task- and job-design interventions aimed at reducing stress and providing psychological empowerment (Kwon & Kim, 2020; Monje Amor et al., 2021), and behavior-based interference could be dealt with by expanding the skills and competencies of employees (Beninger & Francis, 2022; Srikanth & Jomon, 2020). These interventions could also be tested for different conceptualizations of loneliness (i.e., state vs. trait), rather than workplace loneliness (Jones & Hebb, 2003). In addition, specific types of job demands (such as time urgency and administrative hassles) could be tested to check which are especially resource-draining in the remote work environment (Breevaart & Bakker, 2018). As such, we hope that our theory and results can inspire a range of follow-up studies.

As a final suggestion, we encourage future research to follow our lead and include the home dimension when studying remote work to further the understanding of how the home and work domains interact. In particular, the concrete impacts and processes of the “always-on” culture are still relatively unknown but seem to be highly relevant in a world that is becoming more connected than ever before (Eddleston & Mulki, 2015); however—paradoxically—despite this increasing connectivity, loneliness in modern society is *increasing* overall, instead of decreasing (Cascio & Montealegre, 2016).

5.3. Practical implications and conclusions

Reducing workplace loneliness and its negative consequences is a challenge for organizations (Peng et al., 2017). This is especially true for the remote work setting where organizations need to uphold productivity while at the same time not over-burdening or under-supporting their employees, all while the employee is “out of sight” of the organization. Our findings should make organizations aware that, when working from home, job demands can lead to interference and increase employees’ workplace loneliness, which may in turn decrease job satisfaction and job performance (Ozcelik & Barsade, 2018). Given that job support can mitigate these negative effects, practitioners need to think about concrete management policies and practices for employees working remotely rather than staying passive and hoping for the best. Practices that encourage an effective virtual climate, autonomy, participation, and feedback have been strongly linked to greater job satisfaction for remote workers (Adamovic et al., 2021; Gabriel & Aguinis, 2022), and could also be used to alleviate interference and workplace loneliness.

Moreover, practitioners should be aware that home demands can create interference and increase workplace loneliness. Thus, it is crucial that organizations actively assess employee loneliness and proactively provide management support structures that help individuals balance the home and work domains. For instance, flexible work hours may improve work-life balance by allowing employees to actively craft their work schedules. Thus, flexible work hours could serve as an effective resource for reducing work-home interference (Gabriel & Aguinis, 2022; Shagvaliyeva & Yazdanifard, 2014). Because hybrid work is here to stay (Kunze et al., 2020), organizations need to pay attention to finding the right balance between remote and in-person work. Because workplace loneliness is not necessarily low when physical isolation is low—and because it is possible to feel “lonely in a crowd” (Wright & Silard, 2020) interventions designed to increase face-to-face interactions might have to be balanced with practices that have been shown to improve general wellbeing, such as resilience training (Beninger & Francis, 2022), task

and job-design interventions aimed at reducing stress (Kwon & Kim, 2020), leadership practices that balance demands and resources (Bruning et al., 2021), mindfulness practices (Barrios & Pitt, 2021; Krishnan, 2021), and/or HR practices that focus on workload and time management (Otterbach et al., 2021).

Above all, our research indicates that organizations need to pay special attention to the occurrence of workplace loneliness during remote work and can achieve this by reducing demands and interference and by increasing support where possible.

Data availability statement

Results that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy restrictions.

Funding and conflict of interests

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