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Optimizing Remote Work Engagement and Performance

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Optimizing Remote Work Engagement and Performance: Exploring the Impact of Job Design Characteristics and Daily Microbreaks

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Biography

Jessica Jacob Chackoria was born in Mumbai, India on June 23, 1994. She grew up in Dubai, in the United Arab Emirates, graduating from Our Own English High School in 2012. She earned a BSc. in Psychology with Management from Heriot-Watt University, Dubai Campus in 2015, and was awarded the 'The Heriot Prize: Dubai Campus Award for Achievement in Psychology' at the commencement ceremony.

Discovering I-O Psychology during her undergraduate studies and recognizing her passion for it, she moved to the United States in 2016 to pursue graduate studies in the field. During Fall 2016 to Summer 2019, she completed dual Masters degrees—in I/O-Social Psychology and Project Management (Training and Development sequence)—at Illinois State University in Bloomington-Normal, Illinois. Wanting to delve even deeper into I-O-related topics before beginning an applied career, she began the I-O Psychology PhD program at DePaul University, with a concentration in Quantitative Methods, in Fall 2019.

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Abstract

Remote work prevalence continues to remain higher than pre-pandemic levels and hybrid structures are increasingly becoming the norm. Therefore, it is important for researchers and organizations to understand how to optimize important employee outcomes, such as engagement and performance, in a remote work context. In this study, I addressed this need by investigating whether factors that have been found to enhance engagement and performance in traditional contexts—specifically, job design characteristics (task identity, task significance, autonomy, skill variety, and feedback) and microbreaks or small breaks during the workday—were positively linked with better remote work engagement and performance (task and contextual). The impact of these factors on well-being was examined as well. Based on an extensive review of literature on remote work, engagement, performance, the Job Characteristics Model, and microbreaks, eight hypotheses and a research question were developed and then tested using a sample of 456 employees. Although the hypotheses were only partially supported or unsupported, at a high level, findings suggest that task significance, feedback, and autonomy are all beneficial for remote work outcomes. Further, by analyzing open-ended responses, a list of strategies that employees can use to remain refreshed and productive when working remotely was identified. Implications of these findings for research and practice are discussed, along with limitations of the study.

Keywords: job design, job characteristics model, microbreaks, remote work, engagement, performance, well-being , recovery

Introduction

Event Systems Theory (Morgeson et al., 2015) posits that certain pivotal events possess the power to ignite profound and lasting transformations within the world of work. These events, often unexpected and disruptive, can shake the foundations of established practices and compel organizations to reevaluate their strategies and adapt to new realities. One such event that exemplifies this theory's premise is the outbreak of the COVID-19 pandemic in November 2019. Specifically, Event Systems Theory (Morgeson et al., 2015) states that strong events characterized by high levels of novelty (extent to which an event differs from current and past events), criticality (the event's importance), and disruption (extent to which the event obstructs or subverts routine activities) have a large influence on organizational outcomes (Yu & Wu, 2021), especially if they originate at a macro level. The COVID-19 pandemic outbreak qualifies as a strong event within this theory because it occurred at a global level, was highly novel (the most similar event that previously occurred was the flu epidemic in 1918, which was more than a century earlier), extremely disruptive (leading to global shutdowns and stay-at-home orders), and critical due to its financial and health implications (McFarland et al., 2020). Indeed, the ramifications of this global health crisis extended beyond the realms of public health, as it became a catalyst that forced organizations worldwide to swiftly pivot and embrace remote or virtual work as a means to prevent the spread of the relentless coronavirus (Howe et al., 2021; OECD, 2020). The percentage of employees working remotely worldwide increased from 7.9% pre-pandemic, to 17.4% in the second

quarter of 2020, with a higher proportion being reported for developed countries (25%; ILO, 2020). This closely aligns with proportions reported by the U.S. Census Bureau (2022) regarding rates of remote work adoption in America over a similar period. According to the 2021 American Community Survey (ACS), the number of remote workers in America tripled from 5.7% (roughly 9 million people) in 2019 to 17.9% (27.6 million people) in 2021 (US Census Bureau, 2022). Therefore, identifying and understanding evidence-based best practices that optimize employee outcomes became more relevant than ever before (Cho, 2020; Kramer & Kramer, 2020) during the onset of the pandemic.

While there exists a notable body of research on remote work and how it impacts key outcomes at various levels in the organization, the massive acceleration in remote work adoption due to the pandemic has created new research questions that need to be addressed. Early studies on this topic generally investigate differences in outcomes of interest, such as performance and engagement, between remote and standard workers (e.g., Hill et al., 2003; Martin & MacDonnell, 2012; Verbeke, 2008). An examination of factors that vary within remote work arrangements (e.g., features of the job itself or work strategies used by employees) and are known to influence job outcomes has largely been missing from early studies.

I addressed this gap in the research in this dissertation. Specifically, in order to identify ways to enhance remote workers' engagement and, in turn, performance, I harnessed two of the most well-researched areas within Industrial-Organizational (I-O) Psychology, namely, job design (cf. Grant et al., 2010;

Parker et al., 2017) and recovery (cf. Sonnentag et al., 2022). While research in traditional work settings has found that job design features and energy management strategies, such as taking small breaks (i.e., microbreaks [Fritz et al., 2011]), have a beneficial impact on both engagement and performance (Humphrey et al., 2007; Sonnentag et al., 2022), we cannot simply assume that this will hold true in the current remote work context as well. Thus, it is important to conduct research that empirically tests this generalization.

Although COVID-19 is no longer considered as a public health emergency of international concern as of May 2023 (WHO, 2023), the aim of this study remains highly relevant because remote work continues to be regarded as a mainstream work arrangement, as compared to pre-pandemic levels. Even if employees are not being allowed work remotely full-time, hybrid structures are increasingly becoming the norm, wherein employees work in the office for a certain period of time (e.g., two or three times a week) and work remotely the rest of the time. This trend, which was predicted by researchers a few months since the onset of the pandemic (Phillips, 2020), is reflected in the results of several recent surveys. For example, the Pew Research Center reported that 59% of employees whose jobs could be done remotely were still working from home all or most of the time in January 2022, which is a decline from 71% in October 2022, but still considerably higher than 23% before the pandemic (Parker et al., 2022). These figures were reported based on responses collected from a nationally representative sample of approximately 10,000 employees. Further, most employees seem to work remotely due to personal choice (61%) as opposed to

their workplace being closed (38%). This is a reversal of the trend noted in October 2020, when 64% of employees were forced to work remotely due to their offices being closed. Another survey of 2000 working adults in America revealed that 87% of employees who worked remotely during the pandemic preferred to work remotely at least once a week in the future, with 68% indicating that a hybrid model would be ideal (Prudential, 2021). Importantly, Gallup found that 54% of those who work remotely full-time and 38% of hybrid workers would leave their employer if forced to go back to work physically full time (Saad & Wigert, 2021). Based on these survey results, it was suggested that failing to offer any remote work options would be a huge risk to organizations' hiring, employee engagement, performance, well-being, and retention strategies. Forecasts made in the same report suggest that 59% of jobs that can be done remotely will adopt a hybrid structure in 2022 and beyond, and 32% will be done remotely exclusively. On a global level, Gartner (2023) has predicted that 39% of knowledge workers will work in a hybrid format by the end of 2023. Overall, all these survey results and forecasts suggest that remote work will not return to low pre-pandemic levels, and that it would behoove researchers and organizations to understand how to optimize employee outcomes in remote contexts (Demerouti, 2023; Fouad, 2020).

The rest of the introduction is organized as follows. I start by providing an overview of existing research done on remote work, including studies that were conducted before and during the pandemic. Following this overview is a section dedicated to two major outcome variables being investigated in this study, remote work performance and remote work engagement. Both performance and

engagement are commonly studied in organizational literature yet are plagued by definitional issues (Austin & Villanova, 1992; Knight et al., 2017). It is therefore necessary to specify how they will be defined and operationalized in the context of the proposed study. I then discuss each of the dominant theoretical perspectives that this study is based on, i.e., job design characteristics and microbreaks. These discussions will include definitions of key constructs, themes and gaps in extant research, and descriptions of theories that are particularly relevant to the aims of this study. In each of these two sub-sections, I have also highlighted research findings as they pertain to the key outcomes in this study, which are remote work engagement and remote work performance. This is followed by a section on anticipated interactions between job design dimensions and the frequency of microbreaks on remote work outcomes. Considering the growing emphasis of on employee well-being as a valued work outcome, a section outlining the expected impact of these factors on well-being is provided as well. Finally, an exploratory research question is proposed.

Remote Work

Although remote work became a buzzword during the COVID-19 pandemic, the concept has been present in research since the 1970s, albeit under a different label, “telecommuting” (Nilles, 1975). The idea of “telecommuting” initially gained popularity during that time period due to concerns over gasoline consumption, long commutes, and traffic congestion in urban areas caused by an oil crisis (Bailey & Kurland, 2002). However, organizations were slow to adopt remote work arrangements and even in the 2000s, it was considered relatively

new (Cooper & Kurland, 2002). A sizeable body of interdisciplinary research on remote work grew between the 1970s and 2000s, despite the slow adoption rates (Raghuram et al., 2019).

Several labels have been used to refer to remote work in this research, with the most popular ones being telecommuting, teleworking, distributed work, work from home (abbreviated as WFH), and flexwork (Shockley, 2014). In Table 1, different ways in which these concepts have been defined are listed, which show that these labels are largely interchangeable. Based on commonalities among all the definitions, in this study, I have defined remote work as a work arrangement in which employees can complete some portion of their total work hours at a location that is physically distant from their office and rely on technology to communicate with their coworkers.

Table 1

Examples of different labels and definitions related to remote work

Label	Definitions
Telecommuting	• working outside the conventional workplace and communicating with it by way of telecommunications or computer-based technology (Nilles, 1975; Olson & Primps, 1984) • an alternative work arrangement where workers substitute at least some portion of their typical work hours to work away from a central workplace—often from home—using technology to interact with others

	and to complete work tasks (Gajendran & Harrison, 2007)
Remote work	• remote workers are individuals who work from a location that is not at the place of business of the organization for which they work (Felstead & Henseke, 2017) • a flexible work arrangement whereby workers work in locations, remote from their central offices or production facilities, the worker has no personal contact with co-workers there, but is able to communicate with them using technology (Di Martino & Wirth, 1990)
Telework	• substitution of communication technology for work-related travel, and can include paid work from home, a satellite office, a telework center or any other work station outside of the main office for at least one day per work week (Verbeke, 2008) • work arrangement in which employees perform their regular work at a site other than the ordinary workplace, supported by technological connections (Fitzer, 1997)

Distributed work	• arrangements that allow employees and their tasks to be shared across settings away from a central place of business or physical organizational location (Belanger & Collins, 1998)

Most early studies were designed to investigate whether organizations should allow employees to work remotely or not. Therefore, in most of these studies, remote work is used as a categorical independent variable, comparing outcomes between those who worked remotely and in person, and benefits vs. disadvantages of remote work are theorized or empirically investigated. One meta-analysis of 46 field studies conducted at the individual level of analysis revealed that remote work had small, but beneficial effects on several valued outcomes, specifically, job satisfaction, performance, turnover intent, and role stress (Gajendran & Harrison, 2007). Another meta-analysis, which sought to investigate whether these benefits would hold at the organization level, reported that remote work had a small, but positive effect on organizational productivity, retention, commitment, and turnover intention (Martin & MacDonnell, 2012). Performance, along with productivity, has been one of the most common outcomes studied in this literature (Martin & MacDonnell, 2012; Raghuram et al., 2019). A majority of these studies suggest performance tends to be better when working remotely, as suggested by the meta-analyses and reviews cited earlier (Bailey & Kurland, 2002; Rudolph et al., 2021). A review of 80 studies on remote work showed that collectively, a consistent picture of the pros and cons of remote

work emerges (Bailey & Kurland, 2002). The benefits mainly include having a flexible schedule, being free from interruptions, and saving time on commuting. Drawbacks that are often cited include feeling professionally and socially isolated.

Limitations to Conclusions That can be Drawn From Pre-Pandemic Studies

Despite a sizeable body of scholarly work on remote work already being available, there are several factors that limit their applicability to the current work landscape. As aforementioned, early studies generally compared outcomes between remote workers and comparison groups. This research design would be suited to answering questions about whether organizations should allow remote work or not, but is not suitable for investigating how to enhance work outcomes for those who are already working remotely (Wang et al., 2021). The latter would require using a sample of fully remote workers with varying levels of performance. In other words, remote work needs to be treated as a contextual variable rather than an independent variable (Kiburz, 2016; Wang et al., 2021). In this study, I addressed this need by investigating whether factors that have been found to be positively linked to work engagement and performance in traditional contexts have similar positive associations in a fully remote sample as well.

Additionally, despite extant evidence suggesting that remote work performance is better than that of traditional workers, it should be noted that most early studies suffered from a selection bias. Employees who were already good performers were more likely to have been allowed by their managers to work from home, which could explain higher performance from the remote work

groups (Lapierre et al., 2016). Second, even those employees who worked remotely did not do so very frequently (Bailey & Kurland, 2002). Therefore, it would be wrong to accept these findings at face value and make a straightforward assumption that performance is inherently superior for remote workers, without studying factors that contribute to better performance (Pemble, 2020).

Further, media that employees relied on to communicate with coworkers in early studies, such as email, fax machines, and phones (Golden et al., 2008) were far less sophisticated than instant messaging (e.g., Slack) and videoconferencing (e.g., Zoom) platforms that organizations use today. Thus, early studies do not properly account for the richness of communication technology that employees have access to today. Beyond communication, media richness and technological advancements have also changed the way work is performed, observed, and evaluated. Although richness is not specifically a variable being measured in this study, it is important to point out that technology and media used by the participants of this study are more representative of those used in the current context as compared to early studies. This enhances the generalizability of the findings.

Lastly, most early literature on remote work has been criticized for being atheoretical (Bailey & Kurland, 2002; Belanger & Collins, 1998; Gajendran & Harrison, 2007). This study addresses this criticism by drawing on two dominant theoretical perspectives in I-O Psychology, the Job Characteristics Model (JCM; Hackman & Oldham, 1975, 1976, 1980) and the recovery literature.

Remote Work Performance and Remote Work Engagement

Despite early studies indicating performance is higher in remote work as compared to traditional contexts, in light of the limitations of the early body of research mentioned above (i.e., the selection bias, differences in richness of communication media, and lack of theory embedded in the studies), it is still important to identify factors that optimize remote work performance (Pemble, 2020). It is, therefore, essential to first define what remote work performance means in the context of this study. Further, remote work engagement is a popularly studied outcome in itself and has been found to mediate the impact of both work design and breaks on performance in previous studies (Kim et al., 2013). Since remote work engagement is proposed as a mediator in subsequent sections as well, a discussion about the definition and importance of remote work engagement, and its links to remote work performance, is warranted. Therefore, these definitions and discussions are provided in this section.

Remote Work Performance

Performance is the most extensively researched outcome variable in Human Resource Management (HRM) research, but is recognized as a complex muti-dimensional construct that is difficult to accurately define and measure (Borman et al., 1995; Demerouti & Cropanzano, 2010). In many studies, including those focused on remote work, the terms performance, productivity, and efficiency are commonly used interchangeably, with formal definitions of these terms being omitted from papers because their meanings are similar in a colloquial sense (Murphy, 1990). When investigating factors impacting performance, it has been recommended that researchers first review established

performance related frameworks or taxonomies, and then narrow in on a dimension of performance that is most aligned with the goals of the research study (Astin, 1964; Murphy, 1990).

The distinction between *processes* involved in performance vs. the *outcome* of performance is one such established framework (Campbell, 1990; Reijseger et al., 2013). *Process* refers to the actions or behaviors employees take to achieve the goals of their job (i.e., what they actually do at work). *Outcome* refers to goods or services that are produced by employees, and the extent to which these align with the overall strategic goals of the organization (Roe, 1999). *Process* performance has been further distinguished in terms of task/in-role performance, extra-role/contextual performance, and counterproductive work behaviors (CWBs; Koopmans et al., 2011). *Task/in-role performance* refers to role-prescribed behavior that is required to carry out tasks or responsibilities included in an employee's job description and is formally recognized within the organization's reward systems (Williams & Anderson, 1991). A review of different conceptualizations of performance at the individual level suggests that this is the "central" dimension of job performance as it was included in all the conceptualizations that were analyzed (Koopmans et al., 2011). *Extra-role/contextual performance*, also referred to as Organizational Citizenship Behaviors (or OCBs, Organ et al., 2006) refers to voluntary behaviors that are not part of the formal job description but facilitate the effective functioning of the organization as a whole (Becker & Kernan, 2003). CWBs are also voluntary

behaviors, but these are deliberately destructive or dangerous behaviors that can negatively affect the organization (Robinson & Bennett, 1995).

In this study, remote work performance is operationalized as task/in-role performance and contextual performance that is carried out when employees work remotely. This falls under the process rather than outcome approach to defining performance, which is considered to be the more appropriate choice when studying factors that enhance performance via motivational pathways, including job design and work breaks. The reason for this is that employees' behaviors, by definition, are more closely linked to process performance, while outcomes are more distal and influenced by many other factors that are outside the employees' control (Taris & Schaufeli, 2015). Additionally, factors that enhance motivation are more likely to result in increased focus on duties and responsibilities (Corbeanu & Iliescu, 2023). Further, when defined this way, remote work performance and performance in traditional contexts become comparable in many aspects because most of the skills and abilities enabling these behaviors would be similar regardless of working remotely or in the office (Toscano & Zappalà, 2021). The only exception would be the technical skills required to adjust to new ways of working (e.g., using Zoom or Microsoft Teams to collaborate with colleagues). Due to this similarity, the existing evidence and research related to key variables in this study and performance in traditional contexts can be extended to make arguments regarding remote work performance as well.

Another decision relevant to choosing how to measure performance is the choice of subjective vs. objective measures. Subjective measures involve human

judgement (e.g., an employee rating their own sales performance using a Likert scale) while objective criteria do not involve human judgement (e.g., the dollar value of sales generated by an employee; Murphy et al., 2019). Both types of measures have certain limitations. For subjective ratings of performance, impression management or social desirability can be a concern, such that employees may give themselves higher ratings due to a desire to make themselves look good (DeNisi & Shaw, 1977). Objective measures, on the other hand, tend to have low reliability, be deficient (i.e., capture only outcomes of performance as opposed to processes), and are often specific to certain jobs (Berry, 2003). To illustrate the final concern with an example, the dollar value of sales generated can only be used as a performance measure for those working in sales. Employees working in data engineering or consulting will have very different objective indicators of performance. Objective measures of performance are also not easily obtainable for many jobs (Jaramillo et al., 2005). This is especially true for knowledge work or very complex jobs, in which direct measures of countable performance indicators such as production quantity or number of errors are nearly impossible to obtain (Jaramillo et al., 2005; Koopmans et al., 2012). For this study, limiting the sample to one type of occupation could limit the variability in levels of job design characteristics reported in the sample, which has been a drawback of many job design studies in traditional settings (DeVaro et al., 2007). Additionally, research suggests that guaranteeing anonymity and confidentiality of the results reduces concerns of impression management when collecting self-report data (e.g., Krumpal, 2013; Singer et al., 1995). I explicitly stated that

responses will be kept anonymous and confidential in my recruitment messages and Informed Consent sheet that participants read at the beginning of the survey, which should help in reducing these concerns.

Further, I used self-rated remote work performance ratings, which involves employees rating their own remote work task performance and contextual performance as opposed to asking supervisors or coworkers to rate an employee. This is because employees themselves are the most proximal source of information, meaning employees have considerably more opportunities to observe their own behaviors than peers or managers do (Koopmans et al., 2012; Van Der Heijden & Nijhof, 2004). This is especially true when working remotely because they cannot be observed by supervisors or coworkers (Murphy et al., 2019). Therefore, when working remotely, employees themselves are the best judges of processes involved in task and contextual performance. Self-rated performance ratings have been used frequently in previously in studies related remote work (Gajendran & Harrison, 2007), job design (Humphrey et al., 2007), and recovery (Albulescu et al., 2022).

Remote Work Engagement

Work engagement has been a popular construct in research and practice for at least the last two decades, and continues to grow in popularity (Bakker & Albrecht, 2018). As of 2021, there were 40,645 scientific publications that included engagement as a keyword, with the number of publications being nearly 2.5 times higher between 2017-2021 as compared to the previous five-year period (Wontorczyk & Rożnowski, 2022). From a practice perspective, measuring,

boosting, and maintaining work engagement has been a major concern for many organizations (Knight et al., 2017). This popularity is attributed to several consistent findings suggesting that work engagement leads to better performance at multiple levels of analysis, including individual, unit, and firm levels (Durán et al., 2010; Halbesleben, 2010; Harter et al., 2002). Following a brief discussion of the history and definition of the work engagement construct, theories and evidence linking work engagement to better performance will be provided.

History and Definitions. At a high level, three major conceptualizations of work engagement can be found in the literature. The concept was first introduced as a three-dimensional construct by Kahn (1990), who proposed the idea that engaged employees would identify more with their work in three forms – physically, cognitively, and affectively – which would lead them to put more effort into their work. Research on work engagement gained traction later when Maslach et al. (1997) postulated that work engagement is the opposite of burnout (Maslach & Jackson, 1981), and measurable using the Maslach Burnout Inventory (MBI). This conceptualization consists of three dimensions as well – energy, involvement, and efficacy – with each of these being an opposite of the three core components of burnout (i.e., emotional exhaustion, depersonalization, and reduced personal accomplishment, Knight et al., 2017).

Finally, Schaufeli et al. (2002) argued that work engagement is an independent construct, distinct from burnout, that is comprised of three components: vigor, dedication, and absorption. Vigor consists of high levels of energy and mental resilience while working, dedication refers to experiencing a

sense of significance, enthusiasm, pride, and challenge from one's work, and absorption means being fully concentrated and positively immersed in one's work. This conceptualization, and its accompanying measurement scale, the Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2002), has emerged as the most commonly used conceptualization and operationalization of work engagement, as indicated by reviews and meta-analyses (Kim et al., 2013; Lesener et al., 2020). Therefore, based on this conceptualization, remote work engagement in this study is defined as the extent to which remote workers find their work to be stimulating (vigor), meaningful and significant (dedication), and interesting and captivating (absorption; Kim et al., 2022).

Impact on Performance. Studies have consistently shown that work engagement is positively linked with performance. For example, based on data collected from 587 employees in the US, representing a variety of industries and occupations, Halbesleben and Wheeler (2008) reported that supervisors tended to rate highly engaged employees higher on in-role performance than less engaged employees. One meta-analysis found a positive association between work engagement and performance (Halbesleben et al., 2010), with a subsequent meta-analysis indicating positive relationships with task performance ($\rho = .43$) and contextual performance ($\rho = .34$; Christian et al., 2011). This positive impact on performance has been explained theoretically using Broaden & Build theory (Fredrickson, 2001), which suggests that positive emotions widen the spectrum of thoughts and actions that come to an employees' mind (cf. Fredrickson, 2003). In other words, employees in a positive mood tend to consider more alternatives in

any given situation at work, which improves the quality of decision making (Taris & Schaufeli, 2015). Work engagement, which has a positive affective component, therefore helps employees perform better by broadening their thought & action repertoire (Reijseger et al., 2012).

An integrative review of studies on this topic also suggests that work engagement mediates the impact of a range of antecedents on performance (Kim et al., 2013). This has been explained using several well-established theories, including the Job Demands-Resources (JD-R; Bakker & Demerouti, 2008) model and the Conservation of Resources (COR; Hobfoll, 1989) theory. According to JD-R (Bakker & Demerouti, 2008) theory, job performance is influenced by motivational processes whose fulcrum is work engagement (Bakker & Demerouti, 2017; Toscano & Zappalà, 2021), which is initiated by job and personal resources. Job resources refer to aspects of the job that facilitate achievement of work goals and reduction of job demands and the associated costs, while personal resources refer to employees' sense of their ability to control their environments, which includes evaluations of their self-esteem, self-efficacy, resilience, and optimism. In contrast, job demands include all aspects of a job that necessitate effort from the employee. This effort can lead to psychophysiological costs like exhaustion or fatigue, which in turn have the capacity to impair health and, consequently, reduce performance (Demerouti & Cropanzano, 2010). Work engagement emerges when there is an optimal balance between demands at work and the available resources, which protects' employees' health and allows them to focus fully on their work, thereby improving performance. COR (Hobfoll, 1989)

suggest that individuals innately strive to gain, protect, and accumulate resources, which are defined as entities that have instrumental or intrinsic value. These resources can be objects (e.g., a house), conditions (e.g., social support), personal characteristics (e.g., skills and knowledge), or energy resources. Most relevant to this context is the idea of resource investment within the COR framework, which states that individuals strategically invest resources to gain additional resources (Siegall & McDonald, 2004). Since work engagement is triggered by the presence of high levels of resources, engaged employees are likely to invest these resources into performance because it has the potential to earn them rewards and thus, more resources (Halbesleben, 2010).

As indicated by the studies reviewed above, the positive association between engagement and performance and the role of engagement as a mediator explaining the impact of various antecedents on performance have both received strong support in empirical research in traditional contexts. Further, these findings are theoretically rooted in the JD-R and COR models. These empirical and theoretical findings can be extended to predict a positive effect of remote work engagement on remote work performance, and to consider remote work engagement as a mediator in the associations between job design characteristics and performance, as well as between microbreaks and performance. Engagement is maybe even more relevant to performance in remote work as opposed to traditional contexts, because tasks that are done alone are more conducive to absorption or flow, enabling employees to perform better and be better equipped

to handle their responsibilities (Nakamura & Csikszentmihalyi, 2014). More specific rationale for these mediations will be provided in subsequent sections.

Job Characteristics Model (JCM) of Job Design

Job design (also referred to as work design, 'job' or 'work' restructuring, or work organization) involves choices being made about which tasks to group together to form the job, the extent to which job holders will need to adhere to prescribed rules and procedures in completing those tasks, how closely they will be supervised, and various other aspects of the work (Wall & Parker, 2001). Considering these choices form the essence of job design, it is therefore defined as the specification of the content and organization of an employee's work tasks, activities, relationships, and responsibilities (Wall, 1995; Parker, 2014). Several job design theories have been proposed over the years (see Parker et al. [2001] for a comprehensive history of theoretical development in the job design literature and Parker et al. [2017] for a summary of job design research over the previous century) and have been recognized as a rare subset among all organizational theories that is simultaneously considered valid, important, and useful (Grant & Parker, 2009). This is not surprising considering job design has been shown to affect a range of outcomes - including behavioral (e.g., performance, turnover, and absenteeism), psychological (e.g., job satisfaction, work motivation, stress, and burnout) and physical (e.g., blood pressure, cardiovascular disease) consequences – and has been influential in applied contexts, shaping management thinking and practices (Parker et al., 2017).

Among job design theories, the Job Characteristics Model (henceforth abbreviated as JCM; Hackman & Oldham, 1975, 1976, 1980) is widely regarded as the most influential (Boonzaier et al., 2001; DeVaro et al., 2007; Johns et al., 1992; Smither et al., 2004). As of 2017, Hackman and Oldham (1975) was the most widely cited article from the esteemed *Journal of Applied Psychology* of all time. The model identifies five key job characteristics that vary among jobs (listed below; Hackman & Oldham, 1976). High levels of these characteristics favorably impact job outcomes (specifically, motivation, performance, satisfaction, absenteeism, and turnover) via one of three critical psychological states (i.e., meaningfulness, felt responsibility for the work, and having knowledge of the results).

- **Skill variety**, defined as "the degree to which a job requires a variety of different activities in carrying out the work, which involve the use of a number of different skills and talents of the person" (p. 257). The authors argue that employees are more likely to find their job meaningful if it regularly requires them to challenge their skills and abilities, which in turn enhances outcomes (Park, 2017).
- **Task identity**, defined as "degree to which the job requires completion of a 'whole' and identifiable piece of work; that is, doing a job from beginning to end with a visible outcome" (p. 257). Employees who have ownership of a larger part of a "whole" task are likely to consider that work more meaningful than those responsible for smaller parts, which enhances outcomes (Park, 2017).

- **Task significance**, defined as "the degree to which the job has a substantial impact on the lives or work of other people, whether in the immediate organization or in the external environment" (p. 257). Higher significance increases meaningfulness, which in turn favorably impacts outcomes (Park, 2017).
- **Autonomy**, defined as "the degree to which the job provides substantial freedom, independence, and discretion to the individual in scheduling the work and in determining the procedures to be used in carrying it out" (p. 258). Higher levels of autonomy increase the extent to which an individual feels responsible for their work, because it means that the task's outcome is majorly determined by the individual's effort, as opposed to standardized procedures or the supervisors' input. This enhanced sense of responsibility has a favorable impact on outcomes (Park, 2017).
- **Feedback**, defined as "the degree to which carrying out the work activities required by the job results in the individual obtaining direct and clear information about the effectiveness of his or her performance" (p. 258). More feedback on the job enables individuals to have knowledge of the results of their efforts, which enhances work outcomes (Park, 2017).

Major tenets of this model have generally received favorable empirical support over the years. Originally, the theory was formulated on the basis of data obtained from over 600 employees in 62 different jobs (Hackman & Oldham, 1975, 1976). Subsequently, research using the JCM can be categorized as using one of two designs – cross-sectional studies investigating the impact of job

characteristics on outcomes or intervention field studies examining the impact of changes in job characteristics on outcomes (Wall & Parker, 2001). Two major meta-analyses of cross-sectional studies have provided good support for the model. The first of these examined 200 individual studies on the topic and found support for hypothesized links between the characteristics and outcomes, and the mediating role of psychological states (Fried & Ferris, 1987). A recurring trend in this research is that relationships tend to be stronger for psychological outcomes (e.g., satisfaction) than behavioral ones (e.g., performance). This was shown in this meta-analysis as well, but the authors argue that effects on behavioral outcomes, though smaller, do exist and should not be ignored. Humphrey et al. (2007) conducted a meta-analysis 30 years later, including 677 primary studies, and report similar associations between the characteristics and outcomes. However, for subjective performance specifically as an outcome, skill variety was not found to be a significant predictor. The authors argue that this might have been due a low number of jobs being included in the original studies, restricting the range for skill variety. Findings from studies using the intervention design have been similarly supportive as well. A systematic review of 55 such studies revealed that a majority of them (70%) reported a positive impact on performance when increasing the levels of the five job characteristics (Knight & Parker, 2021).

Job Characteristics in a Remote Work Context

Evidently, there is a large body of evidence supporting the JCM in traditional work contexts. This led to a period where interest in studying job design was reduced (Grant et al., 2010). However, comprehensive changes in the

nature of work, such as the exponential increase in prevalence of remote work, should make us question what we know about the effects of job characteristics (Grant et al., 2010). Further, the world of work and organizational climate from the mid-1970s, which is when the model was proposed, was vastly different from that of today (Oldham & Hackman, 2010). Therefore, it would be wrong to stop researching the JCM and declare the model empirically valid (DeVaro et al., 2007). Rather, to remain relevant, it should be tested using data from the current work context. This is especially important because many interventions use these job design interventions as a starting point (Knight & Parker, 2021). In this paper, I have focused only on one of the outcomes originally specified in the model - performance – as the goal of this study is to identify factors that enhance remote work performance.

Few studies have drawn on the JCM to better understand remote work outcomes. As aforementioned, in earlier studies, remote work was generally treated as an independent variable and outcomes (e.g., performance) were compared between employees who work remotely and comparison groups (usually those working in traditional, physical workspace). Certain job characteristics were investigated as mediators or moderators in these studies. For example, in Gajendran & Harrison's (2007) meta-analysis, job autonomy was found to fully mediate the beneficial impact of remote work on job satisfaction, supervisor-rated performance, and turnover intent. However, in order to understand how to enhance remote work outcomes, relationships predicted by the JCM should be investigated in the context of remote work, rather than including

remote work as an independent variable (Wang et al., 2021). This approach allows researchers to focus on varying levels of job characteristics among remote jobs and identify which characteristics impact outcomes of interest, which in this paper are remote work engagement and remote work performance.

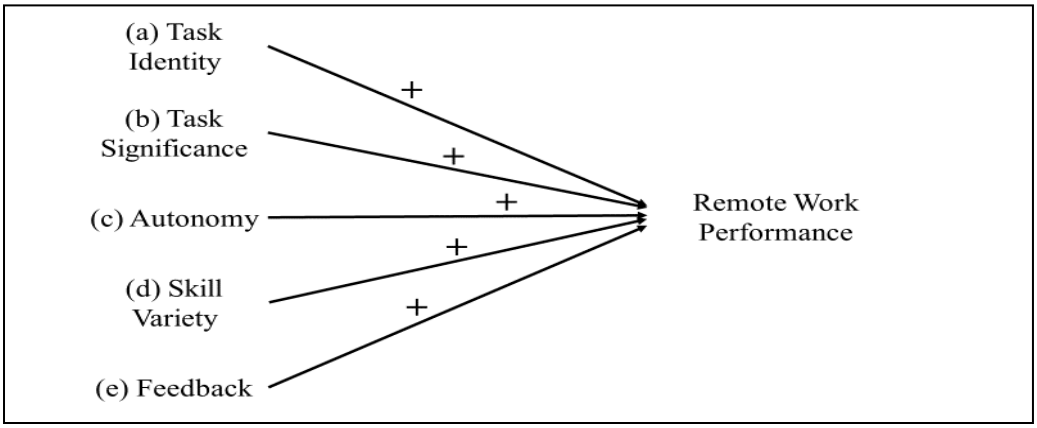
To the best of my knowledge, no study has investigated the effects of all five job characteristics on engagement and/or performance in a remote work context. Some studies have investigated the effect of specific characteristics on remote work outcomes and have yielded contradictory findings. For example, in a study conducted using a sample of fully remote workers before the pandemic, Kiburz (2014) found autonomy and feedback had no effect on job performance. On the other hand, in a study conducted in the early days of the COVID-19 pandemic, Wang et al. (2021) identified autonomy to be one of the work characteristics that are likely to affect remote work outcomes through semi-structured interviews and, in a follow-up study, found that autonomy did increase performance. Clearly, more research is needed to understand the effect of job characteristics on remote work outcomes, in the context of remote work.

The logic underlying the original model can be used to argue that increased levels of job characteristics will be positively associated with remote work performance as well, because they increase employees' intrinsic motivation (Parker, 2014). Research points to two additional mechanisms through which job design characteristics can enhance performance, which are applicable to remote work contexts. Firstly, these characteristics act as resources that enable individuals to cope with strain induced by various job demands, be it cognitive or

emotional demands. This promotes well-being and performance. The second mechanism, learning, is especially pertinent to the feedback characteristic. Regular feedback allows employees to learn, problem-solve, and complete tasks more efficiently in the future, thereby improving performance (Leach et al., 2003). Based on these arguments, I propose my first set of hypotheses (Figure 1):

Figure 1

Hypothesized Positive Associations Between Job Characteristics and Remote Work Performance



Hypotheses 1a-e: Each dimension of the job characteristics model – (a) Task Identity; (b) Task Significance; (c) Autonomy; (d) Skill Variety and (e) Feedback - is positively associated with remote work performance.

Mediating Role of Work Engagement

Extant research in traditional contexts suggests that work engagement mediates the impact of job characteristics on performance. In other words, the effect of job characteristics ignites a sense of enthusiasm for work (i.e., work engagement) in employees, which propels them to better levels of performance (Shantz et al., 2013). Each aspect of this argument has been empirically

supported. Meta-analyses of both cross-sectional and longitudinal studies have found that job characteristics are positively associated with work engagement (Christian et al., 2011; Halbesleben, 2010; Lesener et al., 2020), which in-turn has been linked with better performance in other meta-analyses (Christian et al., 2011; Corbeanu & Iliescu, 2023). Moreover, the mediating role played by work engagement in the association between job characteristics and performance has been reported by a meta-analysis (Christian et al., 2011) and a systematic review as well (Kim et al., 2013).

The citation of multiple meta-analyses above demonstrates that work engagement is widely recognized as both an outcome and a mediator within the existing literature on job design. Research cited in the subsequent section on microbreaks will show that work engagement is similarly found to be an important outcome and mediator in the recovery literature as well. Considering the integrative nature of this study, which draws on both job design and recovery literature, work engagement emerges as a particularly fitting mediator. Therefore, in this study, remote work engagement was chosen to be tested as mediator instead of the three psychological states proposed by the JCM (i.e., meaningfulness, felt responsibility for the work, and having knowledge of the results). Furthermore, one meta-analysis reported a large correlation between work engagement and meaningfulness ($\rho = .74$; Allan et al., 2019). Meaningfulness, in turn, has been recognized as the most “critical” or “central” psychological state by multiple meta-analyses on the JCM (Fried & Ferris, 1987; Humphrey et al., 2007; Johns et al., 1992) because its associations with outcomes

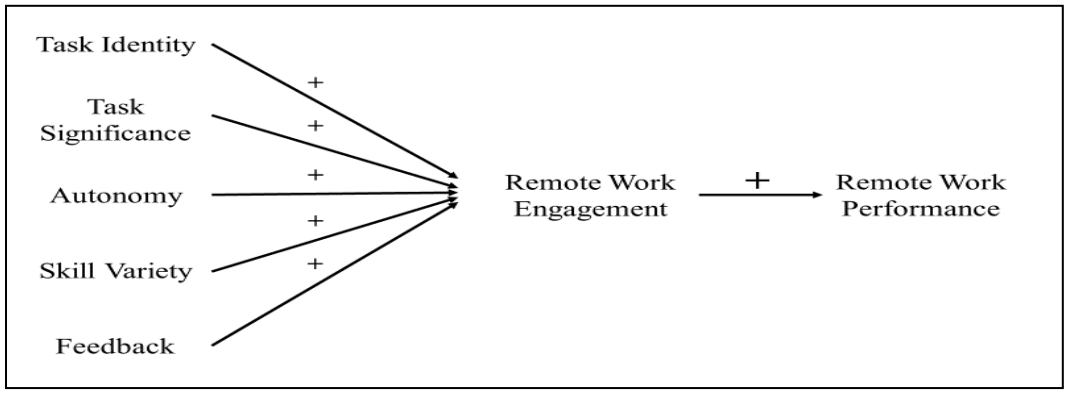
studied are stronger and more consistent as compared to the other two states, and emerges as the strongest mediator when all the variables in the model are tested simultaneously. Thus, the selection of work engagement as the mediator being tested in this study is further justified by its large correlation with meaningfulness.

In the job design literature, theoretical support for the mediating role of work engagement is based two frameworks – the JD-R (Bakker & Demerouti, 2008) model and Social Exchange Theory (Blau, 1964). As aforementioned, the motivational process within the JD-R framework suggests that resources stimulate work engagement, which in turn fosters performance. These resources can be job-related, which are inherent in the way a job is designed, personal, such as resilience, physical and mental energy, and self-esteem. Hackman and Oldham's (1976) five core job characteristics represent some of the most commonly studied job resources in this context, with autonomy specifically being the most popular (Kossyva et al., 2023). High levels of these characteristics in a job help maintain high levels of engagement and performance over time by activating intrinsic motivation and positive psychological states in general (Reijserger et al. 2012; Salanova et al., 2010; van Beek et al., 2012). On a different note, Social Exchange Theory (Blau, 1964) posits that when both the employer and employee adhere to the principles of social exchange, it fosters a relationship characterized by trust and loyalty (Shantz et al., 2013). This is because social exchange involves actions that depend on positive responses from others, and as time goes on, this results in mutually beneficial transactions and relationships. Applied to this context, this theory implies that employees who are provided with jobs that are enriched with

high levels of the job characteristics will reciprocate by being engaged and putting more effort into their performance. This would serve as a way to repay the organization for job resources that are provided to them (Shantz et al., 2013). Based on these theories and evidence, I propose the next hypothesis (Figure 2).

Figure 2

Remote Work Engagement Mediating the Positive Associations Between Job Characteristics and Remote Work Performance



Hypothesis 2. Remote work engagement mediates the positive association between each dimension of the job characteristics model (Task Identity, Task Significance, Autonomy, Skill Variety, and Feedback) and remote work performance.

Microbreaks

The study of microbreaks falls under the larger umbrella of the recovery literature (see Sonnentag et al. [2022] for a review), which is devoted to understanding psychophysiological unwinding following effort expenditure at work (Geurts & Sonnentag, 2006). Microbreaks, however, represent a small subset of recovery research, because the majority of recovery research focuses on

off-work recovery (Chan et al., 2022; Lyubykh et al., 2022), i.e., recovery that takes place after the work day (Demerouti et al., 2009; Sonnentag & Zijlstra, 2006), on weekends (Fritz & Sonnentag, 2005), or vacations (e.g., Fritz & Sonnentag, 2006). Several meta-analyses have already been published that summarize findings related to off-work recovery (e.g., Bennett et al., 2018; Karabinski et al., 2021; Steed et al., 2021). In contrast, very few studies focus on at-work recovery, which refers opportunities to recover within the workday.

In the smaller body of research on at-work recovery, more attention has been given to longer, formal work breaks, such as lunch breaks, instead of shorter and informal microbreaks, examples of which include chatting with coworkers who stop by an employee's desk, grabbing a cup of coffee, or scrolling through social media applications for a couple of minutes (Trougakos & Hideg, 2009). Microbreaks, therefore, represent an under-researched but growing part of the larger recovery literature (Nie et al., 2023) and scholars have called to address this gap, especially in the light of extant findings of their beneficial effects on employee well-being, as well as work outcomes including performance and work engagement (Lyubykh et al., 2022).

Theoretical Evolution of the Construct

The term "microbreaks" originated in the ergonomics literature, where it was used to refer to scheduled rest breaks that employees took to prevent the emergence or advancement of physical problems such as musculoskeletal pain or unease, stemming from extended or recurring duties carried out in an office environment (McLean et al., 2001). However, in the organizational literature,

microbreaks are formally defined as short respite activities that are taken voluntarily between series of task episodes, at the discretion of an employee (Kim et al., 2017). While some variations of this definition are found in this body of research (e.g., Bosch & Sonnentag, 2019; Fritz et al., 2011), they converge on certain defining characteristics that set microbreaks apart from breaks in general and facilitate recovery. Each of these defining characteristics is explained in the paragraphs below.

First, they are *short lived*, making it easier for employees to take the breaks as needed. Specific estimates of the duration of microbreaks vary, but the upper limit is considered to be 10 minutes (Albulescu et al., 2022; Bennett et al., 2020). Despite being short, they can be effective for preserving well-being because recovery from strain outcomes is theorized to follow regressive curves (Lehmann, 1962, as cited in Wendsche et al., 2016), meaning that shorter rest breaks lead to relatively higher recovery than longer rest ones.

Second, these are *self-initiated*, so employees have autonomy over deciding when to take these breaks. This allows employees to choose optimal timings for breaks depending on their idiosyncratic recovery needs and daily rhythms (Kühnel et al., 2017). Similarly, breaks are best at reducing fatigue when taken in a state of increased fatigue (Feyer & Williamson, 1995), making microbreaks more relevant to the recovery process than formally scheduled breaks, because employees can take them when they are most tired. Further, there are instances where rigidly scheduled breaks may cause employees to feel tired or upset, such as being interrupted when working hard to reach important deadline.

In such cases, it would be better for employees to decide when to take breaks rather than stick to a formal schedule (Nie et al., 2023).

The third defining characteristic is that employees have *autonomy over the activities they pursue* over the break. This allows employees to engage in activities that they enjoy, which in turn energizes them by reducing the need to regulate behavior and inducing positive feelings (Sonnentag & Zijlstra, 2006). Preferred activities reduce regulatory burden because employees do not have to make or force themselves to engage in them (Moller et al., 2006; Trougakos & Hideg, 2009). Supporting these arguments, one study found that the effect of social activities during lunch breaks on fatigue were dependent on whether participants chose to do them or not (Trougakos et al., 2014). Social activities were associated with reduced fatigue when lunch break autonomy was high, but associated with increased fatigue when lunch break autonomy was low. Similarly, studies have shown that when engaging in behaviors that are not consistent with their preferences, individuals spend more energy justifying their choices or modifying their preferences, which further depletes mental resources and slows down recovery (Hunter & Wu, 2016).

Lastly, in these breaks, employees should engage *in non-work related and low effort activities*. Effortful break activities, such as completing household chores or answering work emails, requires utilization of the same resources that could be drained by work demands (Meijman & Mulder, 1998; Sonnentag, 2001). Therefore, rather than aid in recovering resources, effortful activities pose additional demands on them. On the other hand, low effort activities aid recovery

by removing demands placed on resources and allowing systems to stabilize (Sonnentag & Fritz, 2007). Additionally, microbreak activities should *not be work related*, allowing employees to psychologically detach from work, which is recognized to be important for recovery (Chan et al., 2022; Etzion et al., 1998; B. Wang et al., 2021). In sum, breaks from work can only be considered "microbreaks" if they are short (i.e., lasting 10 minutes or less), self-initiated, and employees choose which low effort and non-work activities they engage in during the break.

Types of Microbreaks. Earlier studies generally investigated associations between the frequency of taking microbreaks and outcomes of interest, but recently, there has been growing interest in studying the type of microbreak been taken, as opposed to just the frequency (Trougakos & Hideg, 2009; Rost, 2022). Kim et al. (2017) proposed, to the best of my knowledge, the only taxonomy of microbreaks which consists of four categories (listed below). This taxonomy was developed because previous research focused on a narrow range of break activities (e.g., relaxation and socialization; Trougakos et al., 2008, 2014), limiting evidence available to offer practical guidance regarding particular micro-break activities that are beneficial for recovery.

- **Relaxation**: These are activities that momentarily relieve psychological and physical tension from continuous work and further prevent its short-term accumulations throughout a workday. Examples include stretching, taking short walks, listening to music, and gazing out of the window.

- **Social**: This category includes activities related to socializing with coworkers regarding nonwork matters or connecting with friends and significant others through various media including face-to-face conversations, phone calls, texts, or social media.
- **Cognitive**: Activities in this category require some cognitive attention and effort, but they still create mental breaks from work demands by providing a distraction and allowing employees to psychologically detach from work. Examples of these activities include reading newspapers, making personal plans, or surfing the Internet.
- **Nutrition-based**: This involves activities that employees engage in to recover physiological resources. These do not refer to standard meals of breakfast, lunch, or dinner that are required for supporting basic biological functions. Rather, employes choose to engage in these activities as part of an immediate emotion based coping strategy, because they expect to experience an immediate mood boost as a result (Cho & Kim, 2022; Kim et al., 2022). Making a cup of coffee to feel energized during working hours is a classic example of a nutrition-based microbreak activity.

Benefits of Microbreaks: Empirical Evidence and Theories

Based on findings reported in extant research, the recovery literature recognizes microbreaks as a convenient strategy to replenish resources (Kühnel et al., 2017) that are essential for employees' functioning and well-being (Bosch & Sonnentag, 2019; Quinn et al., 2012). For example, in a daily diary study where

data were examined on an hour-by-hour basis, taking microbreaks was found to negatively predict fatigue and positively predict vitality throughout the workday (Zacher et al., 2014). A systematic review (Lyubykh et al., 2022) concluded that taking frequent microbreaks can foster psychological well-being indicated in various forms, such as reduced need for further recovery (Coffeng et al., 2015), increased vigor (Waltz, 2017), and reduced psychological distress (Hurtado et al., 2015). This is supported by a meta-analysis, which reported that microbreaks effectively preserve high levels of vigor and alleviate fatigue (Albulescu et al., 2022). None of the hypothesized moderators in this meta-analysis significantly impacted these associations, leading the authors to suggest that microbreaks might be a "panacea for fostering well-being during work time" (Albulescu et al., 2022, p. 16).

Several theories have been convincingly applied to this context to explain how microbreaks facilitate recovery, and they can be grouped into two main categories: resource-based theories and affect-base theories.

Resource-based theories. These are based on the premise that workers have a limited amount of "personal resources" enabling them to complete a variety of taxing tasks every day. Work is effortful and can drain employees both physically and mentally, this depleting their levels of resources (Trougakos & Hideg, 2009). Resources refer to a range of valued assets, but their exact nature depends on specific theories. In the context of recovery, the most relevant resources are energy (this includes both physical energy to perform work tasks and the subjective feeling of being energized), motivation, and concentration

(Hunter & Wu, 2016; Quinn et al., 2012). These resources are not limitless but more like batteries that need to be charged regularly, and microbreaks enable recovery by providing multiple opportunities for recharging throughout the workday. Theories that fall into this category include COR theory (Hobfoll, 1989), the Effort Recovery Model (ERM; Meijman & Mulder, 1998), and Ego Depletion Theory (Baumeister et al., 1998, 2000).

COR theory (Hobfoll, 1989) theory has the widest conceptualization of resources, as they could include object resources (e.g., money), condition resources (e.g., tenure), personal characteristics (e.g., skills) and energy. While a specific tenet of the theory was described earlier, in a broader sense, this theory suggests that individuals use resources to meet high work demands, but when resources are expended without being replenished, they feel stressed. Therefore, to avoid stress, people are innately motivated to protect and acquire resources. To achieve these goals, individuals can lessen demands or look for replenishing activities. Microbreaks allow for both these strategies, because demands are suspended for the duration of the break, and employees can use that time to engage in replenishing activities (Bosch & Sonnentag, 2019). Further, the theory suggests employees should engage in cycles of recovery to offset resource loss, or else employees may spiral into prolonged impaired functioning (Hobfoll et al., 2018; Lyubykh et al., 2022).

Along similar lines, the ERM (Meijman & Mulder, 1998) suggests that keeping up with high work demands will lead to negative load reactions in employees, which depletes resources and manifests in the form of physiological

(e.g., high cortisol levels) and psychological symptoms (e.g., fatigue) of strain. When exposure to demands ceases, recovery occurs and strain symptoms decrease. However, if work demands continue to be present without any interruption, strain levels remain high and will accumulate over time (Sonnentag et al., 2022). ERM highlights the timing of recovery as critical because continuous exposure to work demands would deter unwinding after work. This was supported by a study in which high exhaustion during the workday predicted low recovery experiences during subsequent time off (Sonnentag et al., 2014). Therefore, smaller recovery breaks taken based on fatigue may be critical to limit long-term damaging effects of work demands on strain, thereby improving well-being (Kim et al., 2017).

Ego Depletion Theory (Baumeister et al., 1998, 2000) centers around a narrower set of resources, namely regulatory resources. Regulatory resources are depleted by any task involving self-control, which includes all work tasks that require sustained concentration. Self-regulatory capacity is considered to be analogous to a psychological "muscle" (Muraven et al., 1998). Over time, with prolonged use, this "muscle" becomes fatigued and functions less effectively, until it eventually weakens. To prevent this, individuals need to pause from effortful regulation to recharge the resources necessary for future behavior control (Muraven & Baumeister, 2000). Considering employees engage in non-work and preferred activities during microbreaks, these breaks can be effective in replenishing regulatory resources.

Taken together, resource-based theories can be used to argue that microbreaks provide timely opportunities for resource recovery, which in turn boosts well-being. Two studies have provided strong support for this argument by directly measuring resource levels and showing that they mediate positive associations between frequency of taking microbreaks and well-being related outcomes (Hunter & Wu, 2016; Nie et al., 2023). This serves as stronger, more direct evidence when compared to many studies on this topic that use well-being indicators (e.g., fatigue) as a proxy for resource level. Further, Hunter and Wu (2016) found that taking more frequent short breaks was associated with greater recovery than taking short breaks infrequently, supporting the ERM's emphasis on timing of breaks as being critical for recovery.

Affect-based Theories. As the name suggests, affect-based theories highlight affect as a key mechanism enabling recovery from exposure to work demands. Broaden and Build theory (Fredrickson, 1998, 2001) proposes that various positive emotions like joy, interest, contentment, pride, and love all have the capacity to expand people's immediate thoughts and actions while also contributing to their long-term personal resources (Fredrickson, 2001). These positive emotions, that can be generated by taking enjoyable microbreaks, encourage proactive behavior, prompting individuals to participate in their surroundings and activities. Consequently, these positive emotions serve as a resource, guiding focus and energy towards work tasks and influencing attitudes and well-being. Similarly, Affective Events Theory (AET; Weiss & Cropanzano, 1996) suggests that certain events in the workplace, labelled as affective events,

trigger short-lived affective reactions that directly influence work-related behaviors and attitudes. Positive affective reactions will energize employees whereas negative affective reactions cause strain symptoms (e.g., stress and emotional exhaustion). Microbreaks can be considered affective events that trigger increased positive affect and lower negative affect due to their enjoyable and relaxing nature (Marzuq & Drach-Zahavy, 2012), thereby boosting motivation and alleviating strain symptoms (Chong et al., 2020).

Empirical studies have supported these arguments as well. For example, one study showed that taking non-work related microbreaks was linked to increased positive affective experiences and decreased negative affective experiences (Trougakos et al., 2008). On the other hand, engaging in work related tasks during microbreaks increased negative affect. Another study found that positive affect mediated the positive effect of taking enjoyable or relaxing breaks on motivation, while negative affect mediated the impact of these breaks on increase emotional exhaustion (Chong et al., 2020).

These arguments can be extended to argue for the beneficial effects of each type of microbreak (Kim et al., 2022):

- **Relaxation**: Relaxation is considered to be a core mechanism enabling recovery (Sonnentag & Fritz, 2007; Kim et al., 2017) because relaxing activities help restore individuals' physical and psychological resources to pre-stress levels, aligned with the resource-based theories. In support of this, studies have shown that short relaxing activities, like stretching and

napping, are linked with lower physical and mental fatigue, and more positive emotions (Henning et al., 1997; Trougakos et al., 2008).

- **Social:** Social interactions at work can be a source of energy for employees, as suggested by the concept of "relational energy" (Owens et al., 2016). This does not refer to a type of energy, rather it proposes that socializing at work increases employees' levels of resources, which can improve their ability to accomplish work tasks. Socialization also acts as a channel for simultaneously reducing negative affect, by allowing employees to focus on non-stressful and enjoyable topics (Sonnentag & Bayer, 2005), and enhancing positive affect by generating feelings of comfort, companionship, and happiness (Carson et al., 2004).
- **Cognitive:** Cognitive microbreaks are theorized to enhance individuals' resource levels and well-being via psychological detachment (Kim et al., 2017; Kim et al., 2018). Despite requiring some effort, these activities provide a distraction from work demands and regulatory tasks, allowing employees to detach themselves from work and replenish resources. Additionally, engaging in low effort cognitive tasks that employees enjoy increases resources such as energy, motivation, and concentration (Hunter & Wu, 2016).
- **Nutrition-Based:** Nutrients from food and drink can impact emotional and mental states, thereby helping replenish resources and triggering positive emotions. Caffeine, for example, is known to boost alertness, activeness, and energy (Häusser et al., 2014). Glucose (or sugar) is an

essential nutrient that the human nervous system. Consequently, individuals with elevated glucose levels often exhibit reduced negative emotions and increased acts of assistance due to their heightened self-regulatory capabilities (Gailliot et al., 2007). Studies on brain functioning have shown that effortful cognitive tasks, such as regulatory tasks, take use up large amounts of glucose (Benton, 1990). Eating snacks during microbreaks can replenish these glucose levels and aid in recovery (Trougakos & Hideg, 2009). Finally, employees tend to snack more on days when they want to minimize negative feels (such as frustration and fatigue) and thus boost their energy (Sonnentag, et al., 2017). Taken together, these arguments suggest that nutrition-based microbreak activities enable recovery because employees take them at critical times and nutrients enable recovery by replenish depleting resources and triggering positive affect.

Kim et al. (2017) tested these arguments and reported that relaxation and social microbreaks both buffered the impact of work demands on negative affect. Contrary to expectations, cognitive microbreaks aggravated the effect of work demands on negative affect. The authors attributed this to the wording of the instrument used to measure cognitive microbreaks, because it did not specify that these activities should be unrelated to work. They addressed this issue in a subsequent study, and found that cognitive microbreaks predicted increased positive affect, similar to relaxation and social microbreaks (Kim et al., 2018). No significant effects were found for nutritional microbreaks in either study, but the

authors warn it might be premature to conclude that nutrition-intake activities have no effect on recovery.

Gaps in Microbreak Research

Evidently, microbreaks are important for employee well-being and recovery. However, nearly all of the studies discussed so far have been conducted on employees in a traditional physical work setting, which is now a major gap in the research. To the best of my knowledge, only one study has investigated how taking breaks throughout the work day impacts remote workers (Cropley et al., 2023). Results of this study revealed employees who failed to take regular breaks were at increased risk of feeling psychologically and physically fatigued, and having more sleep problems. They were also less likely to psychologically detach from work and feel adequately rested. This suggests that theories and findings related to microbreak and recovery found in in-person settings can translate to remote work settings as well. The authors also argue that it is even more important to study effects of microbreaks in remote work than traditional settings, because remote workers have more control over taking their own breaks. Similarly, Albulescu et al. (2022) argue that the largely sedentary nature of remote work tasks (e.g., sitting in front of a laptop throughout the workday and performing tasks requiring constant monitoring and attention) can ultimately have damaging effects if timely and regular breaks are not taken. Taking small microbreaks has also been recommended as a strategy to address Zoom fatigue – i.e., a tendency to feel more exhausted or drained after a virtual meeting held on videoconferencing platforms as opposed to in-person meetings (Shoshan &

Wehrt, 2022) – which was a challenge commonly reported by remote workers during the pandemic (Zhang et al., 2021).

Another major gap is that very few studies have investigated whether these benefits extend beyond well-being to important work outcomes, such as performance and work engagement. While recent research suggests well-being should be considered an important outcome by organizations (Tay et al., 2023), from a more traditional standpoint, individual performance tends to be seen as a more important in a practical sense because it drives organizations and helps them profit (Rost, 2022). Evidence directly linking microbreaks to performance would be necessary to get buy-in from organizations, which would help create a culture where microbreaks are encouraged instead of frowned upon (Rost, 2022).

Through this study, I addressed both these gaps by investigating the impact of microbreaks on remote work performance, mediated by remote work engagement. Further, I examined the effect of each type of microbreak – relaxation, social, cognitive, and nutrition-based – on these outcomes, answering scholars' call for a more detailed examination into what activities employees engage in during breaks (Cropley et al., 2023).

Microbreaks and Remote Work Performance

As aforementioned, to the best of my knowledge, no study has investigated the impact of microbreaks on remote work performance so far. However, in the relatively small body of research on microbreaks and performance in in-person work settings, sufficient theoretical arguments and empirical evidence are available to expect that taking frequent microbreaks will

benefit remote work performance as well. These arguments and sources of evidence are summarized in the subsequent paragraphs.

Theoretical arguments. Based on theories and evidence reviewed earlier, microbreaks are established as being beneficial for facilitating recovery and replenishing personal resources, and researchers argue that this enables employees to perform better (Trougakos & Hideg, 2009). To elaborate, timely resource recovery through microbreaks is extends beyond well-being to work tasks and consequently performance, because it gives more resources for employees to devote to work (Kim et al., 2022). This reasoning is supported by studies that used a within-subjects approach and showed that breaks are linked to increased resources (both mental and affective) and ability to concentrate (e.g., Hunter & Wu, 2016; S. Kim et al., 2018; Zacher et al., 2014; Zhu et al., 2021), all of which are required for good performance (Kim et al., 2022). On the other hand, employees who are unable to recover and persist at work tasks in a depleted state are likely to make more mistakes and work longer and harder to address work demands (Zijlstra, 1993). Similarly, focusing on cognitive resources specifically, *Cognitive Load Theory* (Paas et al., 2010) posits that individuals have a limited set of cognitive resources to devote to tasks. If resources are required for one task, their availability becomes limited for subsequent tasks. Taking breaks helps replenish cognitive resources, thus preventing cognitive overload that could impair performance. This is supported by two meta-analyses showing that short breaks improve cognitive activities such as learning, skill acquisition (Donovan &

Radosevich, 1999), and problem solving (Sio & Ormerod, 2009), which all are all integral to task performance as well (Albulescu et al., 2022).

Some of the theories discussed earlier have been extended to specifically argue for enhanced performance. According to the ERM (Meijman & Mulder, 1998), taking frequent breaks allows employees to recover, which prevents strain and reduces the likelihood of decrements in performance (Lyubykh et al., 2022). Subsequent research done using Broaden and Build theory (Fredrickson, 2001, 2013) suggests that positive emotions help employees expand their range of thoughts and actions, and build a more enduring pool of personal resources (Rost, 2022). This is supported by the Episodic Process Model of Affective Influences on Performance (Beal et al., 2005), which posits that affective states impact cognitive processes and behavioral approaches that support successful task completion. To be more specific, the model posits that affective states not only impact how many resources an individual can devote to work tasks, but also directly impact how they approach tasks and momentary response tendencies when completing tasks (Kim et al., 2018). Taken together, these two theories imply that cumulative increases in positive affect from frequent microbreaks should improve performance (Wendsche et al., 2016).

In addition to these, two more theories have been specifically applied to microbreak research when performance is a criterion variable in the study: Campbell's *(1990)* Model of Task Performance and the Basic Performance Function (Lazear et al., 2015). Campbell's *(1990)* Model of Task Performance states that performance is determined by psychological and physical aspects (i.e.,

KSAs or knowledge, skills, and abilities) and motivational factors (e.g., effort and persistence). On a very similar note, according to the Basic Performance Function (Lazear et al., 2015), performance is jointly determined by both effort and human capital, with human capital referring to KSAs. This theory further suggests that human capital tends to remain stable in the short term. Thus, short-term fluctuations in performance result from changes in effort or physical and psychological conditions (Bakker, 2011). Even highly skilled workers, when sick or depleted, may give their best effort, but their performance could still decline due to their compromised states. Taking microbreaks could prevent such a decline by replenishing their resources so that they are not working in compromised states (Singh et al., 2020).

The expected link between microbreaks and performance has been empirically supported by a few studies. One study of cheerleading instructors found that positive emotions generated by microbreaks seemed to enhance employee performance (operationalized as positive affective displays when giving instructions) immediately following breaks (Trougakos et al., 2008). Other studies have shown that taking microbreaks when doing surgery was beneficial for surgeons' ability to focus and performance (Hallbeck et al., 2017; Park et al., 2017). Substantiating theoretical arguments that warn of impaired performance in the absence of breaks, Dababneh et al. (2001) reported that when allowed to take breaks, employees who took brief and frequent breaks did not show the usual decline in performance during the fourth quarter of the day, which was normally seen when employees were not given breaks. In a small meta-analysis of nine

individual studies, Albulescu et al. (2022) found that microbreaks were linked with reduced fatigue but increased vigor and subjectively-rated performance. This supports the core argument being made earlier, that taking breaks leads to a recovered system (i.e., having more vigor and less fatigue), which enables better performance.

Based on existing research and theory, each type of microbreak can be expected to be related with enhanced remote work performance as well:

- **Relaxation**: Relaxing activities carried out during these breaks, such as meditation and even daydreaming can benefit performance through the pathways discussed earlier. Even short bouts of physical activity that fit into a microbreak, such as boxing, can have benefits (Pronk, 2021). Supporting this, in an experimental study, those who took a 10-minute relaxation break between two administrations of a concentration test all showed improvement on different indicators of performance (i.e., total score on test, error rate, and speed; Singh et al., 2020). Participants spent their break time either boxing, getting a message and meditating, or napping, which are all activities that fall under this category.
- **Social**: Microbreak activities in this category are primarily expected to benefit performance via positive affect, based on the concept of relational energy, affect-based theories, and Beal et al.'s (2005) Model of Affective Experiences, all of which have been described earlier.
- **Cognitive**: Cognitive microbreaks that are non-work related should enhance performance by allowing employees to psychologically detach

from work (Sonnentag, Venz, et al., 2017) and generating positive affect because employees get to pursue tasks that they enjoy. Both these mechanisms help employees recharge and perform better (Kim et al., 2018).

- **Nutrition-based**: Nutrition from food and beverages provides individuals with more resources that can be devoted to work, thus helping them perform better. Few studies on the consequences of consuming glucose act as evidence for this argument. One of these found that participants who maintained glucose levels were better at suppressing negative emotions, which is a self-regulatory task (Gailliot et al., 2007). These findings support the previous argument because a majority of work tasks are regulatory in nature, requiring sustained focus. Another study on work breaks in general (i.e., not specified as microbreaks) showed that breaks involving food intake prevented decline in driving performance, unlike breaks that involved doing nothing (Lisper & Eriksson, 1980), which also supports this argument.

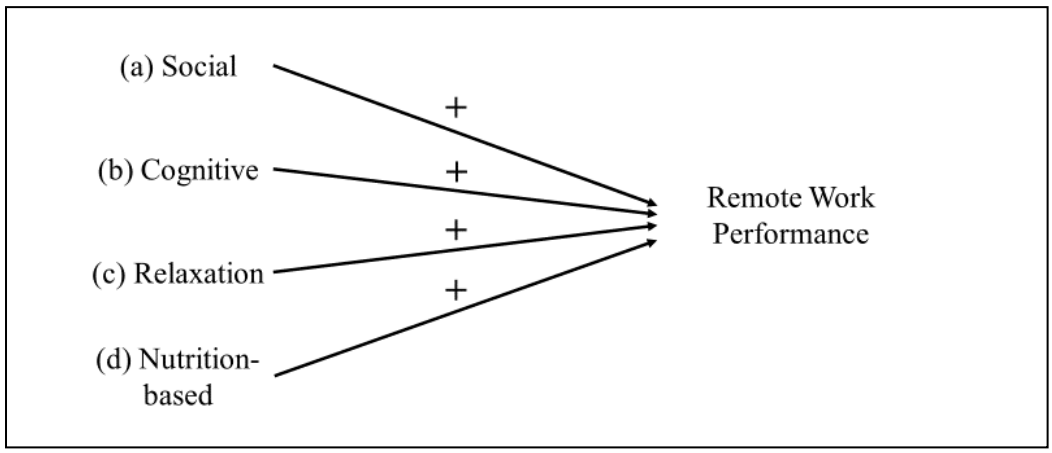
Aligned with most of these arguments, Kim et al. (2022) found that relaxation, social, and cognitive microbreaks were all associated with increased sales performance, with positive affect being a significant mediator. Nutrition-based microbreaks was the only category that was not linked with better performance or positive affect. However, since this was the first study investigating the impact of types of microbreaks on performance, the authors suggest it would be premature to write off the benefits of nutrition-based

microbreaks. Considering this argument, and the logical soundness of the theoretical arguments above, it would make sense to expect nutrition-based microbreaks to have positive impact on performance, even in a remote work context. This expectation is further justified by the fact that remote workers have easier access to snacks and beverages that they like in their own homes, and consuming these is likely to enhance positive affect in addition to providing nutrients, which should boost performance as well.

Since determinants of performance do not majorly change between traditional and remote contexts (e.g., concentrating on tasks, problem solving, etc.), the theories and evidence reviewed thus far in support of microbreaks benefiting performance can be used to argue that they will be linked with better remote work performance as well. Therefore, I propose the below hypotheses (Figure 3):

Figure 3

Hypothesized Positive Associations Between Categories of Microbreaks and Remote Work Performance.



***Hypothesis* 3a-d**: All four categories of microbreaks – (a) social; (b) cognitive; (c) relaxation; and (d) nutrition-based - are positively associated with remote work performance.

Mediating Role of Remote Work Engagement

Researchers have called for more attention to be given to the impact of microbreaks on work engagement (Rost, 2022) as it is recognized to be vital construct for organizations because it is established as antecedent to performance (Bakker & Bal, 2010; Bakker & Xanthoupoulou, 2009). Further, it has been shown that interventions affecting personal resources (such as encouraging employees to take microbreaks) have an impact on performance via work engagement (Kim et al., 2013).

Similar to remote work performance, to the best of my knowledge, no research study has specifically investigated the impact of microbreaks on remote work engagement, but arguments can still be made to expect a positive association between the two, based on a few studies that used samples of in-person employees. For example, in a daily diary study that involved getting data from participants before and after lunch, short breaks and sleep quality both were found to be beneficial for work engagement. Specifically, taking short self-initiated breaks in the afternoon was found to boost daily work engagement, above and beyond the impact of sleep quality (Kühnel et al., 2017). In a sample of nurses, Wang et al. (2022) found that the negative effect of job demands on work engagement became non-significant when nurses took frequent microbreaks during their shift. Similarly, across two studies, Kim et al. (2022) found that employees who started work in

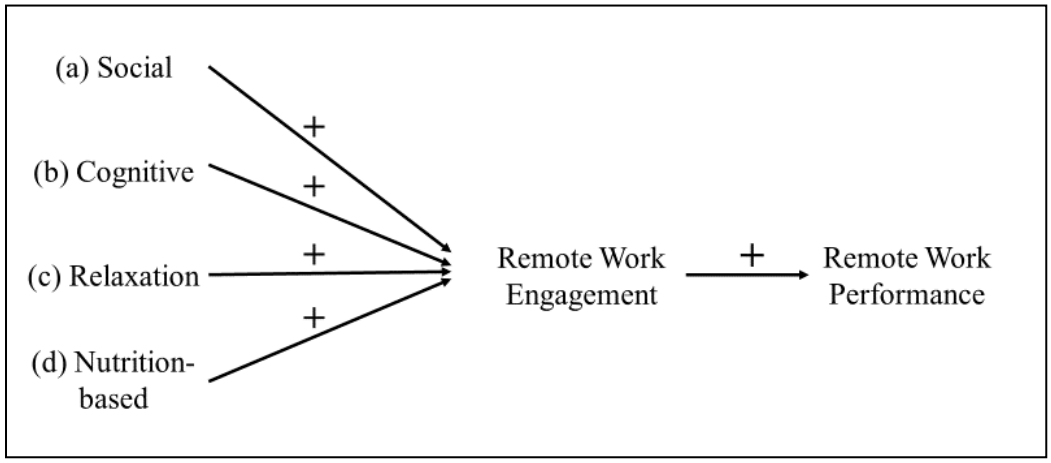
depleted condition (e.g., did not sleep properly the night before) reported more fatigue and took more microbreaks, which in turn was linked with higher work engagement during the workday. This supports the main argument used to hypothesize the benefits of microbreaks to work engagement, i.e., resource-depleted individuals, when given opportunities to relax, can recover their resources which improves engagement and therefore performance (Hagger et al., 2010; Kim et al., 2022).

Resource-based theories imply that recovery via breaks is essential to employees having resources at their disposal in order to experience work engagement (Kühnel et al., 2017), because only then would they be able to direct their attentional focus to their work tasks, be immersed in their work, and feel energetic about working. On the other hand, those who are unable to recover and lacking resources will be reluctant to invest what little resources they do have into work, opting to save them for other purposes instead (Hobfoll, 1989; Sonnentag et al., 2022). Put differently, considering both job and personal resources drive work engagement (Christian et al., 2011), replenishing resource levels during microbreaks can therefore drive engagement. With increased resources, even initially depleted employees can focus on work again and devote more resources to work tasks (Gorgievski & Hobfoll, 2008; Kühnel et al., 2017). Even daily fluctuations in personal resource levels have been found to impact daily fluctuations in work engagement (Kühnel et al., 2017), suggesting that breaks during the workday may be critical to being engaged at work.

Further, since engagement itself is conceptualized to be inherently motivating, having a replenished pool of resources to draw on would result in engaged employees having a resource surplus, termed as “caravan of resources” under COR theory (Hobfoll, 2001). This can help them deal with work demands better and thus, enhance performance (Kim et al., 2018). Applying AET (Weiss & Cropanzano,1996) to this context would result in a similar implication. Overtime, this implies that employees who to regularly take microbreaks will be able to avoid resource depletion, enabling them experience to work engagement and thereby perform better. This supports the role of engagement as a mediator in the impact of microbreaks on performance. The rationale, theoretical arguments, and evidence reviewed thus far should hold in the remote work context as well. Therefore, I propose the following hypothesis (Figure 4):

Figure 4

Hypothesized Mediating Effect of Remote Work Engagement on the Positive Associations Between Categories of Microbreaks and Remote Work Performance



***Hypothesis* 4**: Remote work engagement mediates the positive impact of all types of microbreaks – social, cognitive, relaxation, nutrition-based - on remote work performance.

Job Design and Microbreaks: Interactive Effect on Outcomes

Two major theories described earlier – COR (Hobfoll, 1989) and JD-R (Bakker & Demerouti, 2008) – imply that the impact of job design characteristics on remote work engagement, and consequently remote work performance, would be stronger when employees take more microbreaks, because employees will then have more resources to devote to their work. In other words, it is likely that frequency of microbreaks will moderate the positive association between job design characteristics and remote work engagement, which is then linked with remote work performance.

Within the larger COR (Hobfoll, 1989) framework, the concepts of resource caravans and gain spirals both allude to this moderating effect. According to COR theory, individuals who have a larger pool of resources to draw on are less vulnerable to resource loss, because abundance of resources begets even more resources, acting like resource caravans. On the other hand, those with fewer resources are vulnerable to even more resource loss. Applied to this context, this would suggest that individuals who take frequent microbreaks would be in a better position to fully harness the motivating nature of jobs that are enriched with high levels of the job design characteristics, because of resources gained during the breaks (e.g., feeling refreshed, lingering positive affect after rewarding themselves with a small break, Bosch & Sonnentag, 2019). This would

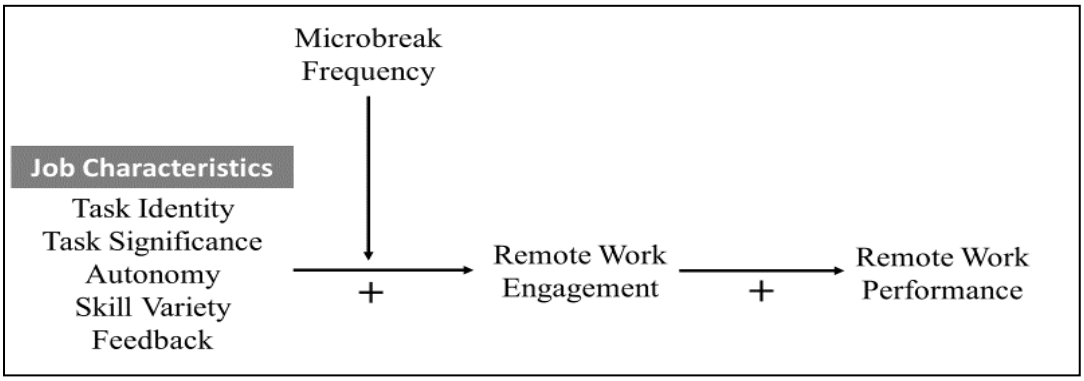
facilitate better work engagement and consequently performance. In contrast, those who do not take enough microbreaks may be unable to fully act on the motivating nature of enriched jobs, due to fatigue or other impairments to health/well-being. Further, the concept of gain spirals, defined as amplifying loops in which interrelated factors continually reinforce each other in a positive manner over time, would suggest that this pattern would result in better engagement and performance for those who have a habit of frequently taking microbreaks in the long run (Salanova et al., 2010).

According to the JD-R, although increase in any type of resource can lead to increases in work engagement, a certain level of personal resources is fundamentally important for work engagement and performance. This is because presence of sufficient personal resources enables employees to make better use of their job resources (van Wingerden et al., 2017). Similarly, a review on remote work engagement revealed that the availability of physical, emotional, or psychological resources to engage in work in the presence of distractors was critical to enabling employees to fully engage in work tasks (Mäkikangas et al., 2022). Therefore, when employees take frequent microbreaks, they will have sufficient personal resources allowing them to make better use of job resources and thus engage better in their work, which should benefit performance. On the other hand, those who do not take enough breaks are likely to find it difficult to engage with their work, due to a lack of personal resources. In light of these arguments, I propose the following hypothesis (Figure 5):

***Hypothesis 5*:** The mediating effect of remote work engagement on the positive association between job characteristics and remote work performance is moderated by frequency of microbreaks, such that the positive association between job characteristics and remote work engagement is stronger for employees who tend to take more microbreaks.

Figure 5

Figure Depicting the Moderated Mediation Model in Hypothesis 5



Effects of Job Design and Microbreaks on Well-being

Considering the recent push to emphasize well-being (defined as optimal functioning) as the most important or ultimate criterion in organizational literature (Tay et al., 2023), the impact of job design characteristics, microbreaks, and their interaction on well-being were also examined.

According to the theory underlying the original JCM (Hackman & Oldham, 1975, 1976, 1980), jobs enriched with high levels of the five job design characteristics should also promote enhanced well-being in employees, via the same three psychological states (i.e., meaningfulness, knowledge of results, and responsibility). This was supported by Humphrey et al.'s (2007) meta-analysis, in

which the five job characteristics were found to significantly correlate with reduced anxiety, stress, burnout/exhaustion, and overload, which are all indicators of well-being. Further, meaningfulness, which has been found to drive the majority of the indirect effects in the model (Allan et al., 2019) has been linked with improved well-being outcomes, specifically life satisfaction, life meaning, and general health in a meta-analysis. The JD-R (Bakker & Demerouti, 2008) model provides additional support for these findings, because these job design characteristics act as resources that promote well-being by helping employees cope with job demands. Based on this reasoning, I propose the below hypothesis:

Hypotheses 6a-e: Each dimension of the job characteristics model – (a) Task Identity; (b) Task Significance; (c) Autonomy; (d) Skill Variety and (e) Feedback – is positively associated with well-being.

As mentioned in earlier sections, findings from one systematic review (Lyubykh et al., 2022) and one meta-analysis (Albulescu et al., 2022) suggest that microbreaks are beneficial for well-being. From a theoretical lens, these empirical findings are supported by resource-based and affect based theories. The resource-based theories (i.e., COR [Hobfoll, 1989], ERM [Meijman & Mulder, 1998], and Ego Depletion Theory [Baumeister et al., 1998, 2000]) all suggest that microbreaks enhance well-being by providing opportunities for employees to replenish their resources as and when required. Affect based theories (i.e., Broaden and Build theory [Fredrickson, 1998, 2001] and AET [Weiss & Cropanzano, 1996]) suggest microbreaks simultaneously allow employees to increase positive affect and decrease negative affect, which enhance well-being by

increasing motivation and reducing strain symptoms (Chong et al., 2020; Marzuq & Drach-Zahavy, 2012). Therefore, I propose the below hypothesis:

Hypothesis 7a-d: All four categories of microbreaks – (a) social; (b) cognitive; (c) relaxation; and (d) nutrition-based - are positively associated with well-being.

Finally, based on the resource caravan and gain spiral tenets of COR (Hobfoll, 1989), frequency of microbreaks can be expected to moderate the positive association between the job design characteristics and well-being. Applied to this context, these concepts suggest that employees who tend to frequently take microbreaks will be able to fully act on the enriching nature of their jobs due to resources being replenished during the breaks, resulting in better well-being (Bosch & Sonnentag, 2019). On the other hand, those who do not take microbreaks frequently will likely have fewer resources at their disposal, thereby limiting the extent to which high levels of job design characteristics can be associated with well-being. Therefore, I propose the following hypothesis:

Hypothesis 8. The impact of job design characteristics on well-being is moderated by frequency of microbreaks, such that positive association between job design characteristics and well-being is stronger for employees who tend to take more microbreaks.

Research Question

In addition to the hypotheses described above, I proposed a research question (henceforth abbreviated as RQ) related to lessons learned from remote

work adoption since the pandemic that would facilitate better understanding of work outcomes in the current remote work context.

Both current and pre-pandemic research on remote work (Gajendran & Harrison, 2007; Howe et al., 2021) suggest that there seems to be a learning curve associated with remote work. As explained by Howe et al., (2021) an abrupt shift to remote work initially caused widespread fear and concern in employees. However, as organizations invested in large scale change initiatives, training, and resources to facilitate the transition to remote work, employees began to test and adopt various strategies to maintain or enhance their remote work performance. Eventually, they found remote work to be viable and manageable, and even enjoyable. Considering it has been four years since the pandemic, it would be advantageous to use an open-ended survey question to collect qualitative data pertaining to effective strategies remote workers use to keep themselves engaged and maintain remote work engagement and performance levels, apart from taking microbreaks.

RQ: When working remotely, apart from taking small breaks, what other strategies do employees use to maintain remote work engagement and remote work performance levels?

Method

Participants and Procedure

The final dataset for this study consisted of responses from 456 participants. To be eligible for this study, participants needed to: (a) be over 18 years of age; (b) have at least one job that involved working for 20 hours a week

or more; (c) be allowed to work remotely for at least a portion of those hours; and (d) be fluent in English. The phrasing of all survey questions specified that participants should be thinking about times they spend working remotely while rating the corresponding items, enabling those who work remotely for at least a portion of the week to be eligible for the study.

Recruitment and Procedure

Participants were recruited for this study in two ways. First, I shared the survey with individuals in my network by making posts on LinkedIn, Facebook, and Geneva. The eligibility criteria specified above were made clear in the initial post (see Appendix A). Second, I recruited participants using Prolific, a crowdsourcing platform that is growing in popularity among researchers (Palan & Schitter, 2018). Data sourced using Prolific has been found to be of better quality than similar platforms available on the market (i.e., MTurk, Qualtrics, and SONA; Douglas et al., 2023). The aforementioned eligibility criteria were entered into Prolific as prescreening criteria, so that the survey was only visible to eligible participants. The final sample consisted of 136 participants recruited via social media and 320 participants recruited via Prolific.

Participants completed the study fully online. They were provided with a link that directed them to the Informed Consent page (see Appendix A), which conveyed the purpose of the study and described their rights as participants. The information on this page was written in compliance with the template provided by DePaul University's Institutional Review Board (IRB). Language used in this template clarified to participants that by completing the survey, they were

indicating their consent to be in the research. Next, they completed some screening questions (Appendix A) that were designed to filter out participants who are not eligible for the study. If they responded to any of the screening questions with “No", they were directed to an ending screen of the survey, in which they were thanked for their interest and responses.

Those who passed the screening questions then completed the survey measures and lastly, some demographic items. One instructed response item was embedded towards the end of the longest survey measure (i.e., the Job Design Survey), to detect and screen out participants who responded carelessly (Meade & Craig, 2012). Specifically, participants were told “To ensure data quality, please choose strongly disagree for this item” (Ward & Meade, 2023, p. 584) and those who selected any other response ($N = 104$) were excluded from the analysis. All 456 participants included in the final dataset passed this attention check. Following Meade and Craig’s (2012) recommendation of including one such item per 50-100 questions, only one such item was included because this survey consisted of a total of 51 questions. At the end participants viewed a debrief page that explained the purpose of the study (Appendix A).

Power and Targeted Sample Size

In this study, each hypothesis was tested either using a multiple regression or a path analysis, and the latter falls under the larger umbrella of Structural Equation Modelling (SEM; Kline, 2023). Since SEM is a more complex analysis than a multiple regression, issues related to power and required sample size were considered with respect to SEM.

No explicit sample size requirements are available for SEM, but several researchers have provided guidelines that should be followed. Ding et al. (1995) suggest that 100-150 participants will be sufficient to conduct SEM. To obtain an estimate of required sample size more specific to the models used in this study, I used Soper's (2020) online sample size calculator for SEM. Based on techniques and equations provided by Cohen (1988) and Westland (2010), this calculator provides a minimum sample size as functions of the ratio of latent variables to indicator variables, and expected effect size, power, and significance. Using this calculator, I estimated that I would need a minimum of 444 participants to detect a small effect size, with 80% power, eight latent variables, and 34 indicator variables. This was calculated with reference to the moderated mediation model for Hypothesis 5 (Figure 5), which requires the most number of paths to be estimated and is the most complex model in this study. Therefore, I aimed to recruit 450 participants. This was slightly more than the previously mentioned estimate to account for the possibility of participants skipping certain key measures. My final sample size of 456 slightly exceeded that goal.

Demographic Information

Participants were asked about their age, gender identity, race, ethnicity, job title, level of education, industry, and their current work arrangement (fully remote vs. hybrid). As best practices with respect to asking employees about age, gender identity, race, and ethnicity are continuously evolving, I used measures for these characteristics that were recommended in a recent technical report by the Society of Industrial and Organizational Psychology (SIOP; Wiernik et al., 2021).

This information was beneficial in providing a picture of how representative the sample is in terms of these characteristics.

Out of the 456 participants in the final sample, the majority (54.9%) self-identified as cisgender women, while 40.7% identified as cisgender men, 1.3% as non-binary, and less than 1% each as non-conforming, trans men, and trans women. The age of the sample ranged from 18 – 72, with the average age being 35.89 years (*SD* = 9.96 years).

In terms of race and ethnicity, the majority of participants were White (64.2%), followed by Asian (15.5%), Black (8.8%), belonging to more than one race (6.2%), Hispanic (4.4%), and Hawaiian (0.4%).

Overall, participants had 376 unique job titles and reported working in a wide range of industries. The most common were Computers (Hardware, Software, and Internet; 12.4%), Finance/Banking/Insurance (8.4%), and Education (8.2%). Nearly half the participants reported that a Bachelors' degree (49.7%) was the highest degree they had, while 14.6% had a high school diploma, 26.8% had a Masters' degree, and 7.5% had a doctorate as their highest degree.

When asked about their current work arrangement, 49.6% reported being fully remote while 50.4% reported being hybrid. Among those who worked hybrid, the most common arrangement reported was three-two split (49.3%), with three days of one arrangement (remote or in-person) and two days of the other.

Measures

Remote Work Engagement. A shortened 3-item version of the Utrecht Work Engagement Scale (UWES-3; Schaufeli et al., 2013) that was modified for

remote work by Toscano and Zappalà (2021) was used to measure remote work engagement. It consists of the following three items that are prefaced with the phrase “When I work remotely,”: “I feel like I am bursting with energy”,” I am enthusiastic about my job”,” I am immersed in my work”. Each item was rated on a Likert scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Remote Work Performance. Two forms of remote work performance were measured in this study, task performance and contextual performance.

In-role/task performance when working remotely was measured using seven items developed by Williams and Anderson (1991), with the items being prefaced with the phrase “When I work remotely, I”. Sample items include “Fulfill responsibilities specified in my job description” and “Perform tasks that are expected of me”. Each item was rated on a Likert scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree).*

Contextual Performance was measured using the five-item “interpersonal helping” subscale developed by Moorman and Blakely (1995). Participants were asked to rate how often they performed each item on the scale, such as “voluntarily help new employees settle into the job” and “go out of your way to help co-workers with work-related problems”, on a scale ranging from 1 (*Never*) to 5 (*Very Often*).

Job Design Characteristics. The five job design characteristics—Task Identity, Task Significance, Autonomy, Skill Variety, Feedback—were measured using the corresponding subscales of Idaszak and Drasgow's (1987) modified version of the Job Design Survey (JDS; Hackman & Oldham, 1975). Each

subscale is comprised of three items that were rated on a Likert scale ranging from 1 (*Very Inaccurate*) to 5 (*Very Accurate*).

Microbreaks. Kim et al.'s (2017; 2018) nine-item measure was used to assess the frequency with which employees took Social, Cognitive, Relaxing, and Nutrition-based microbreaks. Participants were asked to recall short, informal breaks that they take during the day when working remotely, and it was specified that these breaks should be small (no longer than 10 minutes). They were then asked to rate the frequency with which they engaged in each activity listed in the items, on a scale ranging from 1 (*Never*) to 5 (*Very Frequently*). Sample items include "Stretching, walking, or relaxing briefly" and "Chatting with coworkers on non-work related topics".

Well-being. The six-item Short Depression – Happiness Scale (Joseph et al., 2004) was used to measure well-being. Each item in this scale is a feeling (e.g., happy, cheerless) and participants were asked to indicate how frequently they felt that way when working remotely on a seven-point Likert scale ranging from 1 (*Never*) to 5 (*Always*).

RQ: Remote Work Performance and Remote Work Engagement Strategies

One open-ended question was used to gather qualitative data regarding other relevant remote work performance and remote work engagement strategies that participants use. Specifically, they were asked "Apart from taking small breaks, what other strategies to you use to remain refreshed and productive when working remotely?".

Control Variables

Conscientiousness. The Conscientiousness subscale from the Mini-IPIP, a shortened 20-item version of the International Personality Item Pool (IPIP) created by Donnellan et al. (2006) was used to measure conscientiousness. This subscale consists of four items that participants were asked to rate their agreement with on a scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree;* See Appendix A).

Conscientiousness is a personality trait that reflects the extent to which an individual is likely to follow socially prescribed norms for impulse control, to be goal-directed, planful, able to delay gratification, and to follow rules in general (Roberts et al., 2009). Importantly, it has been frequently noted to be linked with better performance in traditional contexts (Barrick et al., 2001; Hough & Oswald, 2008; Ones et al., 2007). Therefore, it was important to include as a control variable.

Technology Reliance for Communicating with Coworkers. The extent to which participants rely on technology to communicate with coworkers was measured by asking participants what percentage of time they spend doing individual work and communicating with coworkers using various media (e.g., email, videoconferencing, planning/scheduling software; See Appendix A for full list adapted from Maynard et al., 2019) when working remotely. The degree of technology reliance was then calculated by subtracting the percentage allotted to individual work from 100% (Rapp et al., 2010). This percentage was divided by 100 to convert it to a proportion, so the scale was comparable to the other study

variables that were all rated on a five-point Likert scale. This is a commonly used approach to measure reliance on technology for communication in teams where members are geographically dispersed (Gilson et al., 2015). This was important to measure because relying on technology for communication is a definitional component of remote work.

Comfort with technology use. Participants were asked to indicate the extent to which they agree with the statement "I am comfortable with the tools that I need to use to communicate with coworkers, when I work remotely" to measure their comfort with using technology when working remotely. The accompanying response scale was a five-point Likert scale ranging from *Strongly Disagree* to *Strongly Agree*.

Experience with remote work. Similar to Allen et al. (2021), experience with remote work was measured by asking participants, "Prior to the social distancing policies associated with COVID-19, how often did you work from home?". The response options were: "never," "a few times a year or less," "once a month or less," "a few times a month," "once a week," "a few times a week," "every day."

Results

Descriptive Information and Correlations

Table 2 shows the means, standard deviations, and scale reliabilities, for all study variables and the intercorrelations between them.

Table 2

Descriptive Information for main study variables and control variables, and inter-correlations

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Microbreaks - Relaxing	*0.23*																	
2	Microbreaks - Social	**.38**	*0.65*																
3	Microbreaks - Cognitive	**.38**	**.50**	*0.60*															
4	Microbreaks - Nutritional	**.19**	**.32**	**.17**	*0.46*														
5	Microbreaks - Overall	**.65**	**.83**	**.73**	**.58**	*0.74*													
6	Job Design - Autonomy	0.07	**.17**	0.04	**.10**	**.14**	*0.89*												
7	Job Design - Identity	0.07	0.03	-0.08	0.01	0.01	**.28**	*0.83*											
8	Job Design - Variety	0.03	0.06	-0.04	0.06	0.04	**.32**	**.18**	*0.83*										
9	Job Design - Significance	-0.02	-0.06	-0.06	0.08	-0.03	**.18**	**.15**	**.40**	*0.84*									
10	Job Design - Feedback	0.05	0.08	-0.01	0.00	0.05	**.25**	**.21**	**.34**	**.38**	*0.8*								
11	Consciento-usness	**-.18**	**-.16**	**-.20**	-0.08	**-.22**	0.00	0.03	0.06	0.08	**.13**	*0.8*							
12	RW Engagement	**-.20**	**-.20**	**-.27**	-0.02	**-.24**	**.21**	**.14**	**.22**	**.28**	**.31**	**.29**	*0.82*						
13	RW Task Performance	-0.07	**-.16**	**-.21**	-0.02	**-.17**	**.11**	**.15**	**.17**	**.16**	**.15**	**.25**	**.38**	*0.86*					
14	RW Contextual Performance	-0.06	0.07	**-.13**	0.08	-0.01	**.19**	**.10**	**.30**	**.33**	**.29**	0.05	**.30**	**.21**	*0.85*				
15	Technology Reliance	-0.05	**.23**	0.04	**.10**	**.14**	0.03	**-.15**	**.18**	0.08	0.01	0.04	0.05	-0.05	**.27**	—			
16	Wellbeing	**-.10**	-0.03	**-.24**	0.01	**-.12**	**.26**	**.14**	**.22**	**.26**	**.32**	**.29**	**.53**	**.31**	**.27**	0.08	*0.89*		
17	Comfort with Techonology	0.09	0.03	**-.09**	0.03	0.02	**.12**	0.09	**.19**	**.13**	**.13**	0.08	0.09	**.27**	**.12**	0.00	**.16**	—	
18	Experience with RW	0.03	**-.10**	0.00	-0.01	-0.04	**.13**	**.12**	0.07	-0.03	0.03	0.00	0.09	0.09	-0.02	-0.07	-0.03	0.01	—
	M (SD)	3.09 *(0.73)*	2.71 (0.78)	2.4 *(0.91)*	3.36 *(0.84)*	2.87 *(0.58)*	4.24 *(0.85)*	3.87 *(0.97)*	4.18 *(0.81)*	3.64 *(0.97)*	3.69 *(0.88)*	3.67 *(0.90)*	3.57 *(0.91)*	4.67 *(0.47)*	3.43 *(0.81)*	0.51 *(0.24)*	3.96 *(0.73)*	4.74 *(0.61)*	3.48 *(2.49)*

Note. All significant correlations ($p < .05$) are in bold. Cronbach's alpha values are reported in the diagonal.

Pre-Processing

For all study measures with more than one item, Cronbach's alpha was calculated to evaluate internal consistency and a Confirmatory Factor Analysis (henceforth abbreviated at CFA) was conducted to justify aggregation using a mean score. Wherever required, items were reverse scored before calculating mean scores. Additionally, for the criterion variables—remote work task performance, remote work contextual performance, and well-being—the normality, skew, and kurtosis of the distributions were examined as well. The results of these tests are presented below. The values obtained for these tests were evaluated by comparing them to published benchmarks. A scale is considered to have acceptable internal reliability if α values are greater than .7 and good above .8 (Nunnally & Bernstein, 1994). For a CFA, a model is considered to have good fit if the CFI and TLI are above .90 (Hu & Bentler, 1999), and the RMSEA and SRMR are below .08 (Brown & Cudeck, 1993). The chi-square tests for all CFAs were significant, but that was not heavily considered because these tests are highly influenced by large sample sizes (Shultz et al., 2021). Additionally, factor loadings are considered weak if they are below .4 (Pett et al., 2005). Acceptable values for skewness fall between ± 2 and between ± 7 for kurtosis (Byrne, 2016).

Job Design Characteristics

The subscales for each of the five job design characteristics showed good internal consistency (ranging from .8 - 9). Five separate single-factor CFAs were conducted, one for each subscale (task identity, task significance, autonomy, skill variety, feedback). The fit indices for all subscales cases showed perfect fit (CFI

and TLI of 1, and RMESA and SRMR of 0) and factor loadings ranged from moderate to strong (0.6 – 0.9).

Microbreaks

The Cronbach's alpha values for each category of microbreaks was considerably below the threshold of .8 (i.e., .6 for social and cognitive, .3 for relaxation, and .5 for nutrition-based), indicating that all subscales had low internal consistency. Four single factor CFAs were conducted as well, one for each subscale. The cognitive subscale had moderate factor loadings (.6 and .7) and perfect fit indices (CFI and TLI of 1, and RMESA and SRMR of 0). For the other microbreak types, the fit indices had the same values indicating perfect fit, but certain major issues were detected. For the social microbreak scale, a negative variance was observed for the second item and the factor loadings one factor loading was very weak (.3). For relaxation, the factor loadings were at the weak threshold exactly (both .4). The factor loadings were only slightly stronger (.5 and .6) for nutrition.

A second-order CFA was also conducted to justify averaging scores from all four subscales to generate an overall score for frequency of microbreaks. This combined measure had better internal consistency (.74) than the individual subscales, but still fell below the threshold of .8. The fit indices fell slightly short of the established thresholds (CFI = .8, TLI = .7, RMSEA = .1, SRMR = .1), indicating poor fit. Further, a negative variance was found for the relaxation factor.

Taken together, these results suggest that extreme caution must be taken when drawing any conclusions about the impact of microbreaks using this measure. It also indicates more research is needed into the psychometric properties of the microbreak scale. This will be elaborated upon further in the discussion section.

Conscientiousness

The conscientiousness scale met the threshold for good internal consistency (.8). All the fit indices for the CFA indicated good fit (CFI = 1, TLI = 1, SRMR = .01, RMSEA = 0) and the factor loadings were moderate to strong (ranging from .6 - .8).

Remote Work Engagement

The remote work engagement scale showed good internal consistency (α = .8) and the results of the CFA revealed perfect fit (CFI and TLI of 1 and RMSEA and SRMR of 0) and strong factor loadings (ranging from .7 - 0.9) for a single-factor model.

Criterion Variables

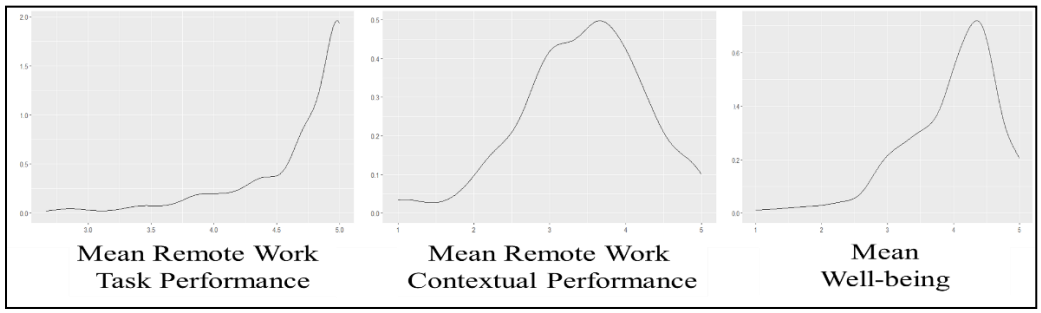
Remote Work Task Performance. This measure showed good internal consistency (α = .8) and good fit as indicated by the CFI (.9) and SRMR (.7), but not the TLI (.8) or RMSEA (.16). Except for one item with a weak loading (.4), all the other items had moderate-strong loadings (ranging from .5 - .8).

As shown in Figure 6, the distribution for task performance appeared to be left-skewed. Although the Shapiro-Wilk's test indicated significant non-normality, ($W = .74$, $p < .001$), the value for skew (-1.86) was just within the acceptable

range of ± 2, and the kurtosis value (3.34) was well within the acceptable range of ± 7. Considering the skew value was considerably close to the -2 threshold, in the Discussion, I will caution the readers against drawing strong conclusions from analyses with task performance as the outcome.

Figure 6.

Distributions of all three outcome variables in the study



Remote Work Contextual Performance. This measure also showed good internal consistency (α = .8.) The RMSEA indicated poor fit (.1), but all other fit indicated suggested good fit (CFI = 1, TLI = .90, SRMR = .03) and the factor loadings were moderate to strong (.5 - .8).

The distribution for contextual performance appeared to be slightly left skewed (See Figure 6) and the Shapiro-Wilk test did indicate significant non-normality ($W = .98$, $p < .001$). However, both the skew (-0.44) and kurtosis (0.24) values were well within the acceptable ranges of ± 2 and ± 7 respectively.

Well-being. The well-being measure showed good internal consistency (α = .9). Apart from the RMSEA (.2), all other fit indices indicated good fit (CFI and TLI were .9, and SRMR = .07). The factor loadings were moderate to strong (ranging from .6 - .9).

Again, the distribution of well-being appeared to be left skewed (See Figure 6) and the Shapiro-Wilk's test suggested significant deviance from normality ($W = .92$, $p < .001$). However, both the skew (-1.14) and kurtosis (1.65) values were well within the acceptable ranges of ± 2 and ± 7 respectively.

Hypothesis Testing

Hypotheses 1a-e

The first set of hypotheses was tested using a multiple regression, with all five job design characteristics—(a) task identity, (b) task significance, (c) autonomy, (d) skill variety, and (e) feedback—being used as predictors. This analysis was conducted twice, once with the criterion being task performance and once with it being contextual performance (see Table 3).

Remote Work Task Performance. The five job design characteristics together predicted a significant 5.58% of variance in task performance, F (5, 449) = 5.31, $p < .001$. Controlling for the other characteristics, only job identity significantly predicted task performance, $\beta = 0.10$, t (449) = 2.05, $p = .04$. Therefore, only Hypothesis 1a was supported with task performance as the criterion.

Remote Work Contextual Performance. The five job design characteristics together predicted a significant 16.69% of variance in contextual performance, F (5, 450) = 18.04, $p < .001$. Controlling for the other job design characteristics, only task significance ($\beta = 0.21$, t [450] = 4.21, $p < .001$), skill variety ($\beta = 0.14$, t [450] = 2.90, $p = .004$), and feedback ($\beta = 0.15$, t [450] = 3.03, $p = .003$) significantly predicted contextual performance. Therefore, only

Hypotheses 1b, 1d, and 1e were supported with contextual performance as the criterion.

Table 3

Multiple regression predicting performance using job design characteristics

Predictor	DV = Task Performance (N = 455)		DV = Contextual Performance (N = 456)	
	β	*SE (B)*	*β*	*SE (B)*
Task identity	0.10*	0.02	-0.01	0.04
Task significance	0.09	0.03	0.21***	0.04
Autonomy	0.02	0.03	0.08	0.05
Skill variety	0.09	0.03	0.14*	0.05
Feedback	0.06	0.03	0.15*	0.04
R^2	.056***		.167***	

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

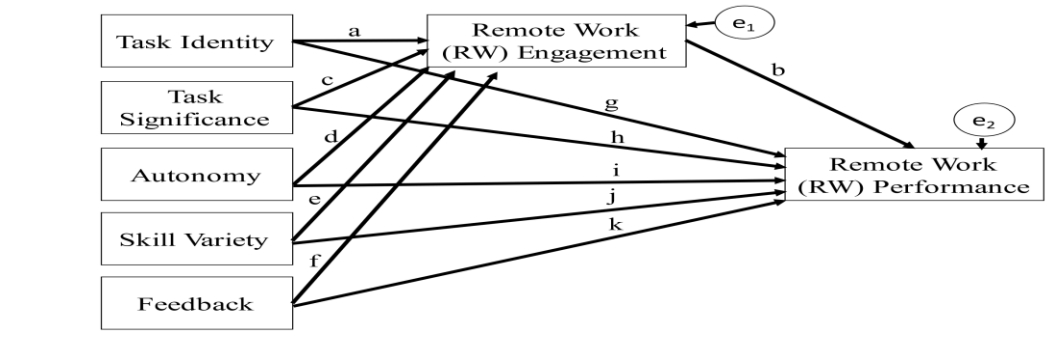
Overall, considering both task and contextual performance, Hypotheses 1a-e were only partially supported by the analyses.

Hypothesis 2

The positive association between each job design characteristic and remote work performance was expected to be partially mediated by remote work engagement. This was tested using a path model depicted in Figure 7. Specifically, the *lavaan* (Rosseel, 2012) package in R was used to estimate both direct and indirect effects in this model, with bootstrapping being used to estimate indirect effects. This involved generating a model, which specified:

Figure 7.

Path Model for Testing Hypothesis 2.



- Remote work engagement is predicted by all five job design characteristics
- Remote work performance is predicted by remote work engagement and all five job design characteristics
- Covariances between all exogenous variables (i.e., the five job design characteristics), and their variances
- Residual variances of endogenous variables (remote work engagement and remote work performance)
- All the indirect effects (a*b, c*b, d*b, e*b, f*b)

Following model specification, relevant functions in R (i.e., *summary* and *parameterEstimates*) were used to obtain estimates of direct and indirect effects. This analysis was conducted twice, once with remote performance being operationalized as task performance and once with contextual performance. In both cases, the model was saturated, so fit indices were not applicable and are not reported.

Remote Work Task Performance. Figure 8 shows the path coefficients of the path model specified to test whether remote work engagement mediated the impact of microbreaks on task performance. As indicated by the direct and indirect effects displayed in Table 4, only the effects of task significance and feedback were mediated by remote work engagement. Since the direct effects were non-significant in these cases, full mediation is implied. Therefore, Hypothesis 2 was partially supported with task performance as the outcome variable.

Figure 8.

Path Model for Testing Mediating Effect of Remote Work Engagement on the Associations Between Job Design Characteristics and Task Performance

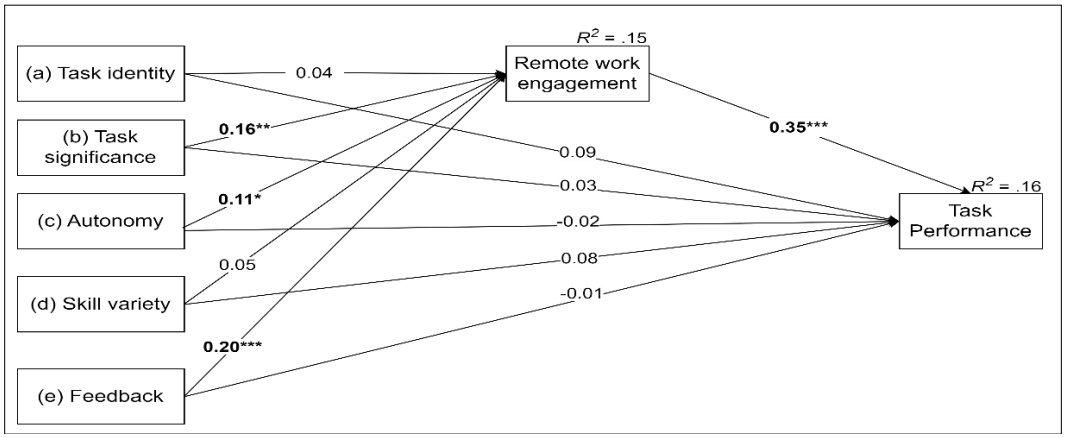


Table 4

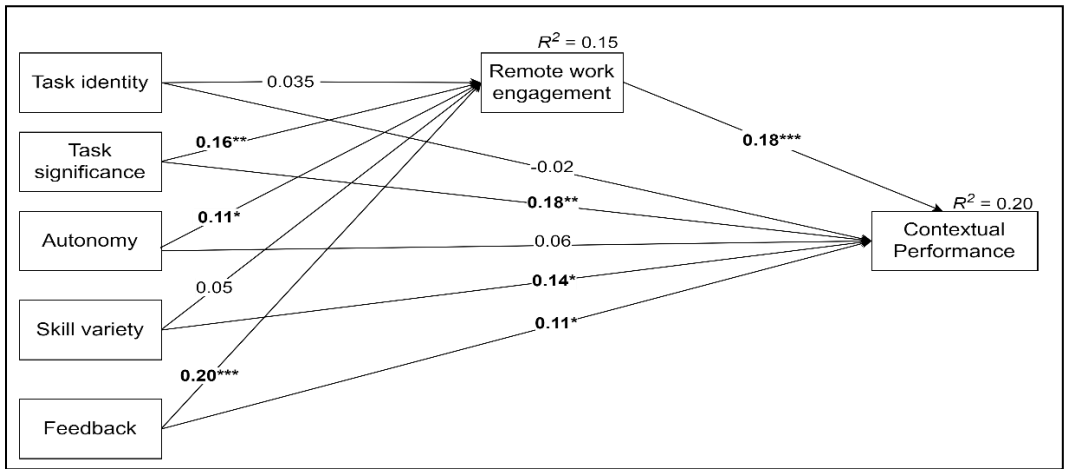
Direct and Indirect effects (through remote work engagement) of job demand characteristics on task performance (N = 455)

	DV = Task Performance		DV = Contextual Performance	
Predictor	Direct Effect *(SE)*	Indirect Effect *(SE)*	Direct Effect *(SE)*	Indirect Effect *(SE)*
Task identity	0.09 (0.02)	0.01 (0.01)	-0.02 (0.04)	0.01 (0.01)
Task significance	0.03 (0.03)	**0.06**** (0.01)	**0.18**** (0.04)	**0.03*** (0.01)
Autonomy	-0.02 (0.03)	0.04 (0.01)	0.06 (0.04)	**0.02*** (0.01)
Skill variety	0.08 (0.03)	0.02 (0.01)	**0.14*** (0.05)	0.01 (0.01)
Feedback	-0.01 (0.03)	**0.07**** (0.01)	**0.11*** (0.05)	**0.04*** (0.01)

Notes. All direct and indirect effects are standardized; Significant effects are bolded

Figure 9.

Path Model for Testing Mediating Effect of Remote Work Engagement on the Associations Between Job Design Characteristics and Contextual Performance



Remote Work Contextual Performance. Figure 9 shows the path coefficients of the path model specified to test whether remote work engagement mediated the impact of microbreaks on contextual performance. As indicated by the direct and indirect effects displayed in Table 4, only the effects of task significance, autonomy, and feedback were mediated by remote work engagement. Therefore, Hypothesis 2 was partially supported with contextual performance as the outcome variable.

Hypotheses 3a-d

This set of hypotheses was be tested using a multiple regression, all four categories of microbreaks—(a) Social; (b) Cognitive; (c) Relaxation; and (d) Nutrition-based—being used as predictors and remote work performance being the criterion variable. This analysis was conducted twice, once with the criterion being task performance and once with it being contextual performance (see Table 5).

Task Performance. The four microbreaks categories together predicted a significant 5% of variance in task performance, F (4, 450) = 5.93, $p < .001$. Controlling for the other categories, only cognitive microbreaks (β = -0.18, t [450] = 3.33, $p < .001$) significantly predicted task performance. Although significant, this implies that taking more cognitive microbreaks was associated with reduced task performance, which is opposite to the hypothesis. Therefore, there was no support for Hypotheses 3a-d with task performance as the criterion.

Table 5

Multiple regression predicting performance using microbreak categories

Predictor	DV = Task Performance (*N* = 455)		DV = Contextual Performance (*N* = 456)	
	β	*SE (B)*	*β*	*SE (B)*
Social	-0.09	0.03	0.17**	0.06
Cognitive	-0.18***	0.03	-0.21***	0.05
Relaxation	0.03	0.03	-0.06	0.06
Nutrition-based	0.04	0.03	0.07	0.05
R^2	0.05***		0.05***	

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

Contextual Performance. The four types of microbreaks together predicted a significant 4.85% of variance in contextual performance, F (4, 451) = 5.74, $p < .001$. Controlling for the other microbreak categories, social microbreaks significantly and positively predicted contextual performance ($\beta = 0.17$, t [451] = 3.05, $p = .002$), thereby supporting Hypothesis 1a. Controlling for the other microbreak categories, cognitive microbreaks had a significant but negative effect on contextual performance ($\beta = -0.21$, t [451] = 3.80, $p < .001$), which is opposite to the predicted direction in Hypothesis 3b. Therefore, Hypotheses 3a-d were partially supported with contextual performance as the criterion.

Thus, Hypotheses 3a-d was partially supported by the analyses.

Hypothesis 4

The positive association between each type of microbreak and remote work performance was expected to be partially mediated by remote work

engagement. Similar to the strategy for Hypothesis 2, this was also tested using a path model (see Figure 10), with *lavaan* being used to estimate both direct and indirect effects, and bootstrapping being used to estimate indirect effects. This involved generating a model, which specified:

- Remote work engagement is predicted by all four microbreak types
- Remote work performance is predicted by remote work engagement and all four microbreak types
- Covariances between all exogenous variables (i.e., the four microbreak types)
- Residual variances of endogenous variables (remote work engagement and remote work performance)
- All the indirect effects (a*b, c*b, d*b, e*b)

Figure 10. *Path Model for Testing Hypothesis 4.*

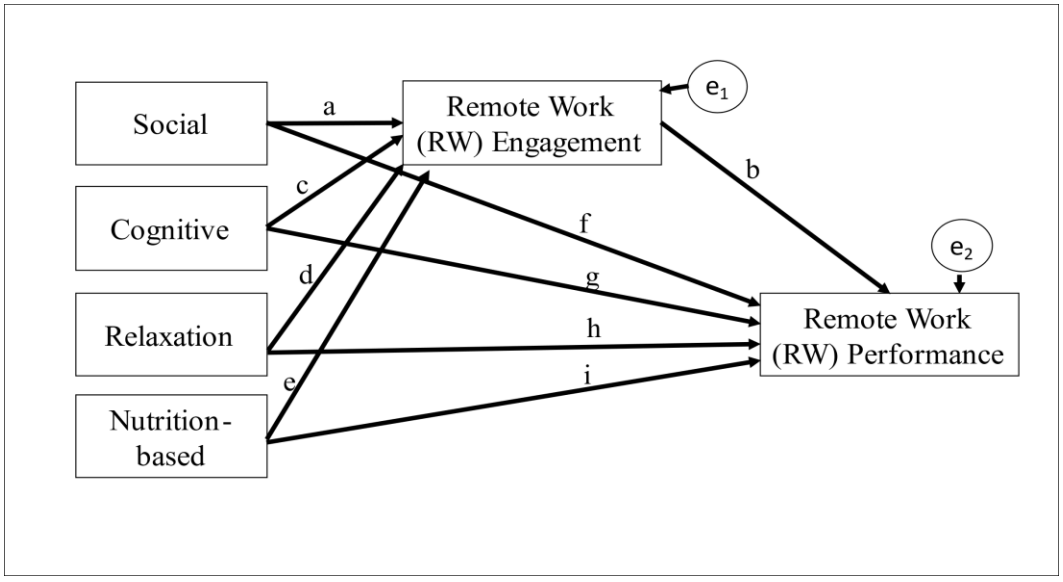


Figure 11.

Path Model for Testing Mediating Effect of Remote Work Engagement on the Associations Between Microbreak Categories and Task Performance

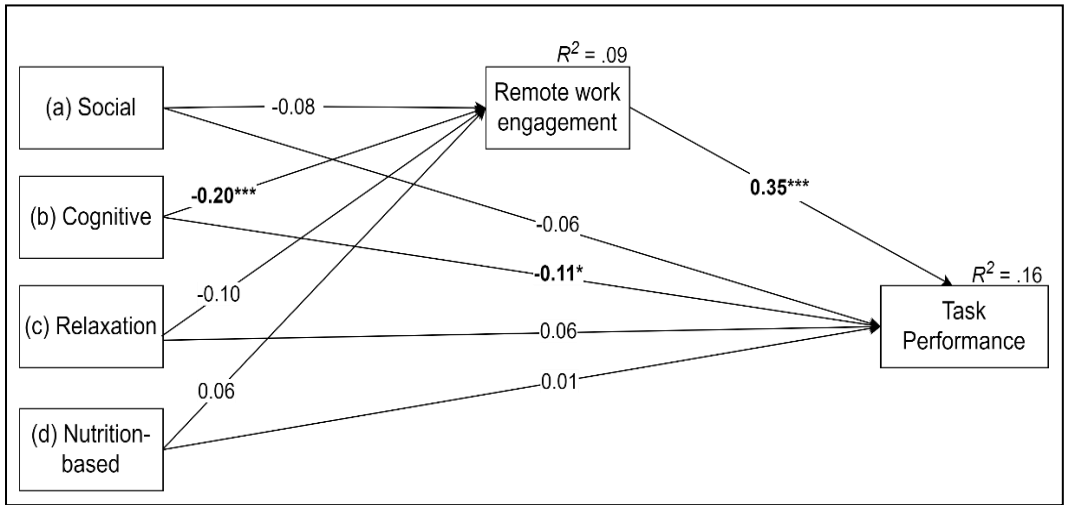
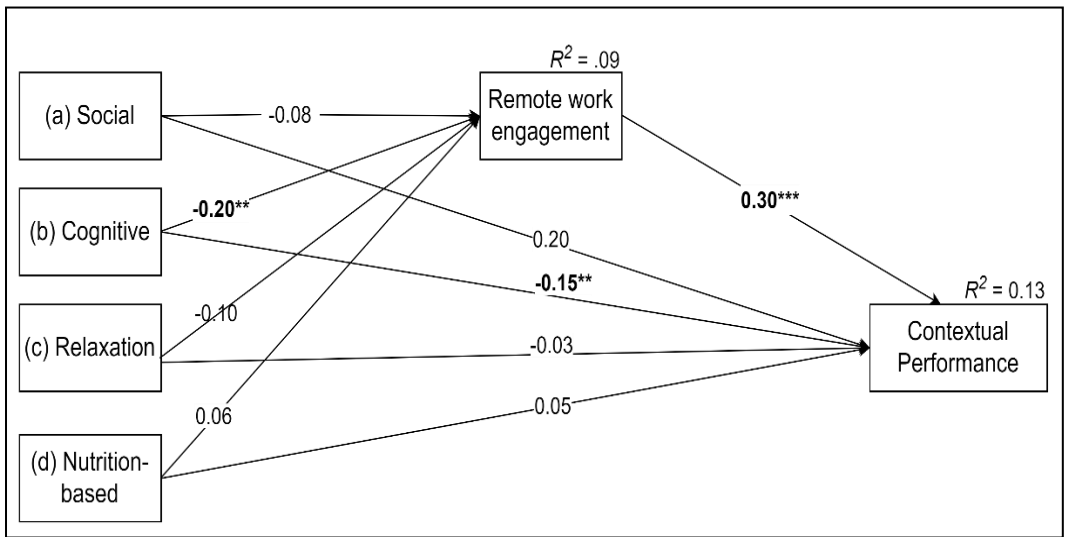


Figure 12.

Path Model for Testing Mediating Effect of Remote Work Engagement on the Associations Between Microbreak Categories and Task Performance



After specifying this model, relevant functions in R (i.e., *summary* and *parameterEstimates*) were used to obtain estimates of direct and indirect effects. This analysis was conducted twice, once with remote work performance being operationalized as task performance (Figure 11) and once as contextual performance (Figure 12). In both cases, the model was saturated, so fit indices were not applicable and are not reported.

As indicated by the direct and indirect effects displayed in Table 6, only the effect of cognitive microbreaks were partially mediated by remote work engagement in both analyses. However, in both, the direction of this effect was negative, which is opposite to the hypothesis. No other significant indirect effects were found. Therefore, Hypothesis 4 was not supported

Table 6

Direct and indirect effects (through remote work engagement) of job demand characteristics on task performance

	DV = Task Performance (N = 455)		DV = Contextual Performance (N = 456)	
Predictor	Direct Effect *(SE)*	Indirect Effect *(SE)*	Direct Effect *(SE)*	Indirect Effect *(SE)*
Social	-0.06 (0.03)	-0.03 (0.01)	**0.20*** ** (0.06)	-0.02 (0.02)
Cognitive	**-0.11*** (0.03)	**-0.07**** (0.01)	**-0.15**** (0.05)	**-0.06**** (0.02)
Relaxation	0.06 (0.03)	-0.04 (0.01)	-0.03 (0.05)	-0.03 (0.02)
Nutrition-based	0.01 (0.03)	0.022 (0.01)	0.05 (0.05)	0.18 (0.02)

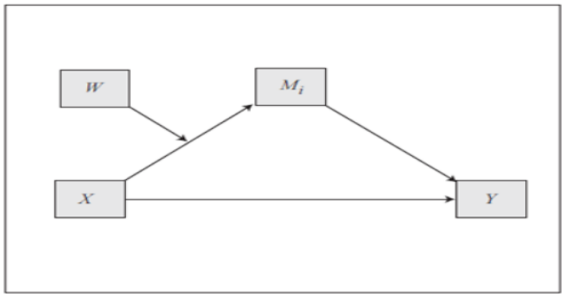
Notes. All direct and indirect effects are standardized; Significant effects are bolded

Hypothesis 5

Conditional Process Analysis, which applies OLS regression methods to analyze path models that include interaction and indirect effects, was used to test the moderated mediation expected in Hypothesis 5 (Kline, 2023). The PROCESS macro (Hayes, 2022) was used to conduct this analysis in R, using *Model 7* that is built into the program as a base (see Figure 13). In this approach, both moderation and mediation are tested in the same model and bootstrapping is used to generate estimates for indirect effects. The moderator used in all the models was frequency of microbreaks in general (as opposed to specific types), which was calculated by averaging ratings for all nine items in the microbreak scale. The mediator used in all models was remote work engagement. This hypothesis would have been supported if the Index of Moderated Mediation for each of the five indirect pathways was significant, and if simple slopes analyses revealed that each indirect pathway was significant at high levels of the moderator (i.e., frequency of microbreaks) but non-significant at low levels of the moderator, for both task and contextual performance.

Figure 13.

Model 7 from Hayes (2013) PROCESS Macro



Model 7 only allows for the effect of one predictor to be moderated at a time. Since my hypothesis includes five predictors (i.e., the five job design characteristics; See Figure 5) and I proposed that all five effects would be moderated, five models were run for each outcome variable. In each of the five models, a different job design characteristic was allowed to interact with microbreak frequency, while the other job design characteristics were added as covariates. This resulted in the main effects in all the models being the same, but the interaction effects changing depending on which job design characteristic was used to create the interaction term.

Table 7

Table showing the index of moderated mediation for the interaction between each job design characteristic and frequency of microbreaks

		Task Performance				Contextual Performance			
Model	Interaction Term	Index	SE	LL CI	UL CI	Index	SE	LL CI	UL CI
1	Identity X MB freq	0.025	0.01	-0.002	0.06	0.022	0.01	-0.003	0.05
2	Autonomy X MB freq	0.027	0.02	-0.004	0.06	0.024	0.02	-0.002	0.06
3	Variety X MB freq	0.014	0.02	-0.01	0.04	0.012	0.02	-0.02	0.04
4	Significance X MB freq	-0.002	0.01	-0.03	0.02	-0.001	0.01	-0.03	0.02
5	Feedback X MB freq	-0.002	0.01	-0.05	0.01	-0.016	0.01	-0.05	0.01

Note. The effects reported are not standardized.

Table 7 shows the index of moderation mediation for each of the five models, for both task and contextual performance. None of these were significant,

because the bootstrapped CIs include zero for all the models. Thus, the results did not support any moderated mediation, yielding no support for Hypothesis 5. Additionally, no interaction effects were found to be significant and so were not probed further. No noteworthy trend or patterns were observed in the results.

Hypotheses 6a-e

A multiple regression was used to test the this set of hypotheses, with each job design characteristic—(a) task identity, (b) task significance, (c) autonomy, (d) skill variety, and (e) feedback—being used as a predictor and well-being being the criterion variable (see Table 8).

Table 8

Multiple regression predicting well-being using job design characteristics (N = 450)

Predictor	*β*	*SE (B)*
Task identity	0.02	0.03
Task significance	0.12*	0.04
Autonomy	0.16***	0.04
Skill variety	0.04	0.04
Feedback	0.22***	0.04
R^2	0.16***	

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

The five job design characteristics together predicted a significant 15.68 % of variance in well-being, F (5,444) = 16.52, $p < .001$. Controlling for the other categories of microbreaks, task significance ($\beta = 0.12$, t [444] = 2.50, $p = .013$),

autonomy ($\beta = 0.16$, t [444] = 3.44, $p < .001$), and feedback ($\beta = 0.22$, t [444] = 4.37, $p < .001$), significantly predicted well-being. This supports Hypotheses 6b, 6c, and 6e, yielding partial support for this set of hypotheses overall.

Hypothesis 7a-d

This set of hypotheses was tested using a multiple regression, with each category of microbreaks—(a) Social; (b) Cognitive; (c) Relaxation; and (d) Nutrition-based—being used as predictors and well-being being the criterion variable (See Table 9).

Table 9

Multiple regression predicting well-being using types of microbreaks (N = 450)

Predictor	*β*	*SE (B)*
Social	0.11*	0.05
Cognitive	-0.28***	0.04
Relaxation	-0.05	0.05
Nutrition	0.03	0.04
R^2	0.07***	

Together, the four microbreak types predicted a significant 6.81% of variance in well-being, F (4, 445) = 8.14, $p < .001$. Controlling for the other microbreak categories, social microbreaks significantly and positively predicted well-being ($\beta = 0.11$, t [445] = 1.99, $p = .048$), thereby supporting Hypothesis 7a. Controlling for the other microbreak categories, cognitive microbreaks had a significant but negative effect on well-being ($\beta = -0.28$, t [445] = 5.18, $p < .001$), which is

opposite to what was predicted in Hypothesis 7b. Therefore, Hypotheses 7a-d were partially supported by the analyses.

Hypothesis 8

In this hypothesis, it was predicted that frequency of microbreaks would moderate the positive impact of job design characteristics on well-being, such that positive association between job design characteristics and well-being would be stronger for employees who tend to take more microbreaks.

As having interaction terms between microbreaks and every job characteristic in the same regression model resulted in very high collinearity, this hypothesis was tested by specifying five separate models. While all five job characteristics were included as predictors in each model, a different characteristic was allowed to interact with microbreak frequency in each model. Well-being was the outcome variable in all the models. The significance of the interaction term in each model was examined to determine whether this hypothesis was supported. As shown in Table 10, none of the interaction terms were significant. Therefore, no moderation effect was observed and Hypothesis 8 was not supported.

Table 10

Interactive effect between frequency of microbreaks and each job design characteristic on well-being (N = 450)

Model	Interaction Term	*β*	*SE*	*t*	*p*
1	Identity X MB freq	0.46	0.06	1.47	.14
2	Autonomy X MB freq	0.27	0.07	0.78	0.43

3	Variety X MB freq	-0.18	0.07	0.54	0.59
4	Significance X MB freq	-0.07	0.06	0.27	0.79
5	Feedback X MB freq	-0.37	0.06	1.23	0.22

Note: Every model consisted of six predictors each (i.e., the displayed interaction term and all five job design characteristics)

Research Question

I used Inductive Content Analysis (ICA), a qualitative analysis technique, to identify commonalities in strategies used by employees to remain refreshed and productive when working remotely. Two defining characteristics of ICA are that it is an inductive process and involves iterative coding (Vears & Gillam, 2022). Inductive process refers to discovering codes to label sections of text while examining the data, as opposed to deductive analyses where categories are predetermined. Iterative coding means that the coding is repeated at least once, because codes that are discovered towards the end of examining the data maybe relevant to earlier portions of the text as well.

I conducted the ICA following steps outlined by Elo and Kyngäs (2008). First, I completed one round of open-coding of all 437 open-ended responses to the research question, which involved reading through all the open-ended comments and writing relevant codes beside them. I then repeated this process, to check if any codes discovered towards the end of the first round corresponded to earlier comments as well, and vice versa. Next, I grouped the codes to create categories of strategies. Following these steps, I identified 13 high level strategies that employees used to remain energized and productive when working remotely.

Table 9 lists these strategies, along with codes and examples of quotes that correspond to these strategies. Additionally, some codes appeared in multiple comments but could not be grouped into categories (see Table 10).

Table 11

Major categories identified from the open-ended responses (N = 437)

Category	Codes	%	Examples
movement	• walking • other active movement (e.g., yoga, working out) • stretching	41.42	*"I also pace and use a standing desk so I can move. Moving keeps me able to concentrate"*
nutrition	• energy boosters • eat • water • cooking	25.86	*"Stay hydrated and nourished"*
media playing in the background	• music • background tv • podcasts • background sounds	24.26	*"Usually have on tv shows in the background that I am familiar with to help with my mind wandering"*
scheduling	• scheduling strategies • pomodoro • time blocking • time boxing • chunking	16.7	*"Set consistent start and end times, allocate specific periods for focused work, breaks, and lunch"*
variety	• in terms of task performed • in terms of work location	12.59	*"I swap between projects, if I get stuck somewhere, I can work on another one for a bit and come back to the first with fresh eyes"*
socialization	• interact with coworkers • interact with friends/family • interaction (not specified) • socializing outside work	8.92	*"I try to schedule coffee chats with my coworkers every so often so it feels like we are still having those water cooler convos"*
setting boundaries	• separate work area • separate lunch from desk • boundaries	7.55	*"I do not sit at my desk while on lunch or any time outside of working hours"*

	• strict end time • disengaging during off time		
ambience for work	• minimize distraction • candles • outdoor sights or sounds	6.41	*"Lighting a candle, using Glade spray to play with scents"*
goals and incentives	• goal setting • incentives	5.72	*"setting a goal of getting a certain amount done before I take a break"*
home office setup	• ergonomic set up • clean • comfortable	5.72	*"I use a height-adjustable desk, and an anti-fatigue mat. I use a height-adjustable seat with a firm cushion"*
sleep	• nap • optimizing previous night sleep	4.58	*"Make sure to get enough sleep the night before"*
wellness practices	• meditation • prayer • aromatherapy • deep breathing • light therapy • mindfulness	4.35	*"I meditate twice a day to clear my mind"*
protect eyes	• diverting gaze from screen • closing eyes • special glasses to protect from strain	2.75	*"Look away from the screen for a few minutes"*

Note. The % column shows the percentage of open-ended comments that contained phrases belonging to the corresponding category.

Table 12

Uncategorized codes that appeared in multiple comments (N = 437)

Code	Percentage	Example
outdoors	11.9	*"step outside to get a breath of fresh air"*
pets	11.21	*"I also am able to pet my dogs while working and that helps my well being."*
errands	3.43	*"I will do small tasks around the house to help me feel productive but not bored of the same work tasks"*
formal wear	1.14	*"I'm always in work-wear, even if it's comparatively comfortable to typical office-wear."*
longer break	1.14	*"I take a longer break most days to work out or go for a walk outside, weather permitting."*
positivity	0.92	*"Post it notes to remind me to think positively"*
read	0.69	*"I take breaks to read the news, a book, news article. "*

Note. The % column shows the percentage of open-ended comments that contained phrases belonging to the corresponding category.

Supplementary Analyses

All tests of the hypotheses were repeated with control variables, specifically, conscientiousness, reliance on technology to communicate with coworkers, comfort with technology required for remote work and experience with remote work. The results of these tests are provided in Appendix B. In all the tests, conscientiousness and comfort with technology were significantly related to task performance, and reliance on technology to communicate with coworkers was significantly associated with contextual performance, which resulted in some differences in which predictors emerged significant. This will be acknowledged in the Discussion section when interpreting the results. Overall, no major differences were found with respect to support for hypotheses when control variables were added to the model.

Discussion

Overall, all the hypotheses in this study were either were partially supported or completely unsupported by the data. In all the hypotheses, significant direct or indirect effects of multiple variables (i.e., all five job design characteristics or all five microbreak categories) on the outcome were predicted. No analysis resulted in significant effects being found for all the predictors in the models, and therefore, no hypothesis was fully supported. With most of the predictors in the multiple regressions and indirect effects in the mediation models being non-significant, it was understandable that none of the hypothesized moderated mediation or moderation effects were supported by the data. However,

there were some themes related to the impact of job design and microbreaks found that will be discussed subsequently. I will also list some additional important themes from the results that were not previously hypothesized but were noteworthy. Within each of these sub-sections, resultant research and practical implications of the findings will be discussed.

It is important to note before delving into the discussion that the distribution of task performance appeared to deviate considerably from a normal distribution. Since the skew value nearly met the threshold for skewness, strong conclusions about the effects of the predictors on task performance will not be drawn. Similarly, the scales for the microbreak categories had very low internal consistency. The internal consistency for the full microbreak scale, used as a measure of overall microbreak frequency, was slightly better but still below the acceptable threshold. Therefore, strong conclusions about the impacts of microbreaks cannot be drawn in this study.

Impact of Job Design Characteristics

Different job design characteristics emerged to be significant predictors of different outcomes. Task significance was significantly associated with better task performance (when control variables were included in the regression model), better contextual performance, and better well-being (with and without control variables). The effects of task significance and feedback on both forms of performance were mediated by remote work engagement (both with and without control variables), suggesting that higher levels of these characteristics are associated with better remote work engagement, which in turn is associated with

better performance. Feedback and autonomy were also positively associated with well-being, with and without control variables. Considering all three outcomes simultaneously (i.e., task performance, contextual performance, and well-being), task significance, feedback, and autonomy all seem to be beneficial in the context of remote work. From a practical perspective, this finding has two potential implications. First, it would be advantageous for organizations to investigate and apply techniques to increase task significance, feedback, and autonomy in individual employees' jobs. Second, practitioners should carefully consider how these job design characteristics would be influenced by technology adoption in the workplace. Increased standardization of work due to newer technologies being used in organization could potentially reduce the sense of autonomy, significance, and feedback in jobs (Parker & Grote, 2022).

Less consistent evidence was found for the other job design characteristics. Task identity was significantly associated with task performance, but this effect did not hold when control variables were added to the model. One possible explanation for this could be that the nature of work has been becoming increasingly interdependent and cross-functional (Salas et al., 2017), making it difficult for individuals to discern the extent to which they can claim responsibility for a task when rating Likert-scale items.

Skill variety appeared to have a significant direct effect on contextual performance in a mediation analysis, but this effect disappeared when control variables were added. Despite this inconsistent effect of skill variety specifically, it is interesting to note here that adding some form variety to their daily work

schedule was a recurring theme in responses to the open-ended question, in which participants were asked how they remain refreshed and productive when working remotely. This variety was not with regards to skill, but in terms of location where work was being done (e.g., different rooms in the house, or switching between coffee shops, own home, and a library), the tasks that were being done (e.g., answering emails for a while and then answering phone calls for a while; both these example draw on the same communication skills, but the tasks themselves are different), or the intensity of work (e.g., alternating between easy and difficult tasks), not necessarily in terms of skills. This observation opens up a potentially interesting avenue for future research, to examine what forms of variety contribute to better remote work outcomes. Although the impact of these strategies on remote work outcomes cannot be quantitatively tested in this study, their benefits can be theorized based on the job crafting literature. Broadly, job crafting refers to proactive behaviors that employees engage in to change their job demands and resources, with the goal of enhancing the fit between these aspects of their jobs and their own abilities and needs (Tims & Bakker, 2010; Rudolph et al., 2017). More specifically, adding variety, which increases the motivating potential of a job, falls within a dimension of job crafting that is labeled as increasing structural resources (Lazazzara et al., 2020), which in turn has been linked with better work engagement and performance in traditional contexts (Rudolph et al., 2017).

Taken together, the findings regarding the impact of job design characteristics on remote work outcomes in this study mirror other mixed findings

in this literature (Kiburz, 2014; Wang et al., 2021), and underscore the need for more research on this topic. A comprehensive study examining the impact of all five job design characteristics and the proposed mediators (i.e., meaningfulness, felt responsibility for the work, and having knowledge of the results) on outcomes in remote work contexts could be beneficial in diagnosing which mechanisms proposed in the original model are relevant in today's world of work.

Impact of Microbreaks

The most consistent finding with respect to microbreaks was that cognitive microbreaks were negatively associated with all three remote work outcomes (i.e., task performance, contextual performance, and well-being), with and without control variables included in the model. This negative impact was mediated by remote work engagement when for both task and contextual performance. This mirrors Kim et al.'s (2017) finding, which at the time was explained by the fact that the wording they used in the items related to cognitive microbreaks did not specify that the cognitive activities should be unrelated to work. This reasoning, however, is not applicable to this study because the revised cognitive break measure (Kim et al., 2018) that was intended to fix this issue was used. Considering this, from a recovery perspective, the likely explanation for this negative effect is that the continued use of regulatory resources during cognitive microbreaks hinders recovery and adds to strain, even though the resources are devoted to activities that employees enjoy.

Another consistent finding was that social microbreaks were linked to better contextual performance. This could be explained by applying Self-

Determination Theory (SDT; Deci & Ryan, 2000) to this context, which suggests that all employees have an innate need for relatedness or belongingness, defined as the extent to which they are connected to other people. Satisfaction of this need for relatedness, in turn, has been linked to better prosocial or helping behaviors that are characteristic of contextual performance (Gagné, 2003; Pavey et al., 2011). Therefore, increased interaction with others during social microbreaks could improve contextual performance by satisfying employees' innate need for relatedness. However, the social microbreaks subscale was shown to have a negative variance in the results of the CFA. Negative variance estimates, referred to as Heywood Cases, are a common symptom in factor analysis and SEM of poor model fit (Kolenikov & Bollen, 2012). Therefore, this finding cannot be counted as a major conclusion from this study.

Relaxation and nutrition-based microbreaks were not found to be significantly associated with remote work performance or well-being. Relaxation was found to have a very small negative bivariate correlation with well-being. However, no significant effects were found in the multiple regression models. This, combined with the measurement issues of the microbreaks measure, indicate that it would be premature to conclude relaxation microbreaks negatively impact well-being.

Trends noted in the open-ended responses could potentially provide an explanation for the lack of consistent findings related to relaxation and nutrition-based microbreaks. To elaborate, these trends indicated that participants were engaging in relaxing and nutrition-based activities, but not necessarily within a

seven- to ten-minute time frame. For example, many participants reported that they have music playing in the background and set up their work environment such that they feel relaxed and comfortable while working, and make sure they drink water or other energy drinks as needed to make sure they have the energy they need to work. Another trend was finding ways to keep physically active while working, such as buying a standing desk, using a walking treadmill, or taking work calls while walking outdoors. With respect to nutrition-based activities specifically, many participants reported that they take long lunch breaks to cook and eat, which gave them a longer time period to disengage. This in turn, helped them feel more refreshed when they returned to work. Therefore, these trends suggest that relaxation and nutrition-based activities could potentially be important for remote work outcomes, but measuring these by asking participants how frequently they take small breaks to do these activities may not be appropriate. Rather, measuring how participants integrate these activities into their workday may be more beneficial.

Other Noteworthy Themes

Certain themes emerged from the findings that were not specifically hypothesized but deserve to be mentioned. First, remote work engagement emerged as a strong predictor of both task and contextual performance, with and without control variables. It was strongly and significantly correlated with well-being as well. This beneficial effect provides support for findings from previous meta-analyses (Christian et al., 2011, Halbesleben et al., 2010; Mazzetti et al., 2023) in a remote work context. Future research could build on this finding by

systematically investigating whether antecedents of work engagement that have been identified in a traditional context (e.g., Lesener et al., 2019) are applicable to the remote work context as well. This finding also adds to the argument for organizations continuing to devote resources to building work engagement.

Second, consistent associations were found between some of the control variables and outcomes. Conscientiousness was significantly associated with task performance in all the analyses conducted, supporting findings from previous meta-analyses in traditional contexts (Barrick et al., 2001; Hough & Oswald, 2008; Ones et al., 2007). Interestingly, it was also moderately and significantly correlated with well-being. These findings differ from studies done earlier during the pandemic, which suggested that conscientious coworkers were at higher risk of increased strain, dissatisfaction, and performance deterioration (Evans et al., 2022; Venkatesh et al., 2021). This change illustrates the learning curve associated with remote work that was previously discussed (Gajendran & Harrison, 2007; Howe et al., 2021). Plausibly, employees high on conscientiousness struggled more due to the abrupt shift to remote work at the onset of the pandemic, owing to their increased innate need for order. However, this study's findings suggest that conscientious employees likely found strategies to perform well and protect their well-being over the years since the pandemic began.

Third, increased reliance on technology was associated with better contextual performance in all the analyses that were conducted. This is easily explained logically, as more interactions with colleagues would motivate

employees to engage in helpful behaviors that fall within construct of contextual performance. Practitioners could potentially leverage this finding by creating more opportunities that allow employees to interact with each other while working remotely. For example, the application store on Slack, which is a communication platform widely used by organizations, has multiple options for applications that help create virtual watercooler chat rooms on the platform. These applications provide enjoyable ice breaker questions and games to act as conversation starters for employees and help them get to know and get along with each other. Encouraging the use of these applications would be one way to increase communication between employees when working remotely and through that, contextual performance.

Research Question

Based on the themes identified by the ICA that was conducted using responses to the open-ended research question, the following list of strategies used by employees to remain engaged emerged:

1. **Incorporating movement into their workday**: Participants reported that moving frequently helped them stay attentive. They accomplished this through many different ways, such as buying a walking treadmill or standing desk that allowed them to move in their workstations, taking calls while walking outdoors, or taking longer breaks to work out.
2. **Staying nourished and hydrated**: Participants ensured they had easy access to water, food, caffeine, and other energy boosters such as energy drinks and nicotine gum to ensure they physiologically had enough energy

to work. Many also reported taking full lunch breaks away from their work desks to cook and eat lunch, which allowed them to fully disengage from working during that time.

3. **Playing media in the background**: Playing media in the background such as music, tv shows, or podcasts was commonly reported as a strategy used to remain focused. One participant specified that this prevented their mind from wandering when working remotely, which is a plausible mechanism for the perceived beneficial effect of background sound.
4. **Using special scheduling strategies**: Many specific scheduling strategies were mentioned by the participants, such as, time blocking or chunking, pomodoro technique, and time boxing. Time blocking or chunking refers to dividing working hours into discrete blocks that are dedicated to a group of tasks or activities (Powers, 2020). For example, as a Graduate Assistant, I could block out 9am-1pm to work on research projects, 1pm-2pm to respond to emails, and 2pm-5pm for grading. Time boxing, a term borrowed from agile project management, refers to dedicating a certain amount of time each day to a specific task (Zao-Sanders, 2018). An example would be dedicating an hour every evening to writing a draft of a research paper. The Pomodoro technique is a specific time management strategy where small breaks are built into the schedule (Cirillo, 2018). Specifically, it involves 25 minutes of focused work without any distractions, followed by a five-minute break (Biwer et al., 2023). Although these strategies are commonly discussed on social media and in

the popular press, the perceived benefits of these strategies have not been empirically tested, to the best of my knowledge. This represents a gap that researchers could address in the future. Further, participants reported creating their own strategies based on an understanding of their own work preferences. For example, one participated reported scheduling their most complex tasks for the morning knowing they focus best in the morning and less likely to be disturbed at that time.

5. **Adding variety to their workday**: As mentioned earlier, participants reported building variety into their workday in terms of work location, such as working from different rooms in the house or coworking spaces, and tasks being performed.
6. **Socializing**: Participants reported socializing in different ways to keep themselves energized. Some made time to chat or talk to coworkers, or talk to their friends, partners, or family members while working. One participant reported scheduling social events with friends frequently after work to make up for the lack of interaction while working remotely.
7. **Setting boundaries**: Setting physical and time-related boundaries was another strategy reported by participants. Examples of physical boundaries included having a separate area strictly dedicated to work and ensuring lunch breaks were taken away from their desks. Having a strict end time to stop work was the time-related boundary, after which some reported only engaging in non-work related activities afterwards to allow them to fully disengage.

8. **Creating the right ambience for work**: Steps taken to create the right ambience for work reported by the participants included allowing natural lights and sounds from the outdoors to enter their work area, minimizing distractions, lighting candles, and using sprays for preferred scents.
9. **Setting goals and incentives**: This strategy involved setting specific goals (e.g., finishing a project) and incentives for reaching those goals (e.g., allowing themselves to take a long break after reaching the goal).
10. **Getting enough sleep**: Ensuring they had enough sleep, either by going to bed at an appropriate time or taking naps during longer breaks, was another common theme.
11. **Setting up their home office**: Participants reporting investing in specific ergonomic equipment for their home offices (e.g., standing desk, walking treadmill, etc.), and making sure these spaces were clean and comfortable.
12. **Engaging in wellness practices**: Specific wellness practices, such as meditation, prayer, aromatherapy, light therapy, deep breathing, and mindfulness, were mentioned as strategies to remain focused.
13. **Protecting eyes**: This category refers to specific actions taken to protect the eyes from strain, such as investing in special glasses, periodically diverting one's gaze from the screen, or closing one's eyes.

This list could potentially act as the starting point for a quantitative investigation into practical strategies that employees use to remain productive when working remotely. Spreading awareness about these strategies could also

provide employees with new ideas that they could incorporate into their routine or validate their own strategies by seeing how common they are.

Here, it is important to note that work design, particularly the aspect of autonomy, is crucial for employees to be able to implement these strategies. Autonomy allows employees to make decisions about when to take breaks, schedule tasks according to their individual work styles, alter task sequences, and establish firm boundaries for their working hours. Additionally, skill variety is necessary for enabling certain specialized scheduling strategies. Remote jobs designed with high levels of these characteristics can empower employees to utilize these tactics that allow them to remain refreshed and productive when working remotely.

Limitations

There are some important limitations to this study that must be acknowledged. First, this was a cross-sectional study in which data was collected at a single time-point. This raises possible questions about directionality of effects. Further, some researchers have suggested that the effects of job and personal resources are best examined at the state level, which refers to momentary levels of resources that can fluctuate daily (Xanthopoulou et al., 2009) This contrasts with general tendencies, which reflect resource pools that employees maintain over longer periods of times. While general levels can impact state levels (George, 1991), it is state resource levels that are proposed to trigger processes resulting in better performance (Xanthopoulou et al., 2009). Therefore, a longitudinal experience sampling method (ESM) in which state levels of job and

personal resources are measured at multiple time points may perhaps be better suited to investigate the joint impact of job design and recovery strategies on remote work outcomes. Further, all data was collected from the same source at the same time point, possibly creating common method bias. Specifically, a consistency effect, defined as the tendency of respondents to attempt to maintain consistency when responding to items they perceive to be similar, could lead to the appearance of associations between variables that may not exist at the same level in real-world settings (Podsakoff et al., 2003). An ESM design can reduce these concerns as well, as participants are less likely to be able to remember their responses over multiple data collection time points.

Second, there are some limitations concerning the self-report task and contextual performance scores that were used as the main outcomes in this study. Scores for task performance specifically tended to be lenient, a risk with self-rated task performance that has been noted in the literature (DeNisi & Shaw, 1977). Although the use of this measure in this study was justified because of the lack of opportunity for others to evaluate employees' performance when working remotely and the difficulty in identifying one common objective measure that would be applicable to a wide range of jobs, future studies could possibly address this issue by using other-rated performance in addition to self-rated task performance. Using other-rated performance in addition to self-rated performance would also alleviate some concerns regarding the common method bias and consistency effect.

Additionally, contextual performance was operationalized as helping behaviors targeted towards other employees in the organization, such as volunteering to help new employees settle into the job and adjusting their own work schedule to accommodate other employees' requests for time-off. In the OCB literature, this is referred to as OCB-I, or OCB that is targeted towards other individuals (Williams & Anderson, 1991). However, this is only one aspect of contextual performance, as helping behaviors could be targeted towards the organization itself as well (e.g., defending the organization when others criticize it, attending functions that are not required but that help the organizational image; Lee & Allen, 2002). These behaviors, labeled as OCB-O, or OCB that is targeted towards the organization, could also be impacted by job design and microbreaks. Therefore, future research could examine the impact of these factors on both OCB-I and OCB-O to fully understand their interactive effect on contextual performance.

Third, results of the CFA and the Cronbach alpha indicate that the psychometric properties of microbreak scale need to be re-examined. Due to psychometric issues with the scale, no major practical implications of microbreaks were extrapolated.

Fourth, the sample in this study was fully remote or hybrid, allowing for measurement of varying levels of the job design characteristics when participants worked remotely and therefore an examination of their impact on the outcomes of interest. However, participants' ability to take microbreaks, the impact of those breaks on the outcomes, and their interaction with the job design characteristics,

would all be differentially impacted by whether they worked fully remote or hybrid. Even more changes in these aspects could be observed for employees who work in-person. Therefore, to comprehensively understand the joint impact of microbreaks and job design characteristics on work outcomes, it might be beneficial to compare employees who work fully in-person, fully remote, and hybrid.

Fifth, participants were not asked about disability status as part of the survey. This could potentially impact employees' preferences to work remotely or in person and the types of activities they choose to engage in during breaks. Therefore, it would be beneficial to collect data regarding disability status in future studies.

Finally, in order to identify themes from responses to the open-ended question, I conducted an Inductive Content Analysis individually, which involved generating codes for each response and then grouping the codes into categories. As this process can be subjective, in future studies, this process could be made more robust by asking multiple raters to code the responses and using Cohen's kappa to check agreement between the raters.

To conclude, the findings from this study serve as an example to illustrate DeVaro et al.'s (2007) argument that, despite all the evidence available to support the JCM, it is wrong to stop testing the model in new contexts and declare it empirically valid. New research is constantly needed to re-evaluate influential models, especially when faced with unprecedented levels of change that characterize the world of work today. Despite the specific hypotheses in the study

being largely unsupported, the findings open interesting avenues for future research that have been delineated above. Therefore, it could potentially instigate more research that integrates two of the most dominant perspectives in our field, job design and recovery, to optimize outcomes for remote workers.

References

Albulescu, P., Macsinga, I., Rusu, A., Sulea, C., Bodnaru, A., & Tulbure, B. T. (2022). “Give me a break!” A systematic review and meta-analysis on the efficacy of micro-breaks for increasing well-being and performance. *PLOS ONE*, *17*(8), e0272460. https://doi.org/10.1371/journal.pone.0272460

Allan, B. A., Batz-Barbarich, C., Sterling, H. M., & Tay, L. (2019). Outcomes of Meaningful Work: A Meta-Analysis. *Journal of Management Studies*, *56*(3), 500–528. https://doi.org/10.1111/joms.12406

Allen, T. D., Merlo, K., Lawrence, R. C., Slutsky, J., & Gray, C. E. (2021). Boundary Management and Work-Nonwork Balance While Working from Home. *Applied Psychology*, *70*(1), 60–84. https://doi.org/10.1111/apps.12300

Astin, A. W. (1964). Criterion-centered research. *Educational and Psychological Measurement, 24*(4), 807-822.

Austin, J. T., & Villanova, P. (1992). The criterion problem: 1917–1992. *Journal of Applied Psychology*, *77*(6), 836–874. https://doi.org/10.1037/0021-9010.77.6.836

Bailey, D. E., & Kurland, N. B. (2002). A review of telework research: Findings, new directions, and lessons for the study of modern work. *Journal of Organizational Behavior*, *23*(4), 383–400. https://doi.org/10.1002/job.144

Bakker, A. B., & Xanthopoulou, D. (2009). The crossover of daily work engagement: Test of an actor-partner interdependence model. *Journal of Applied Psychology*, *94*(6), 1562-1571.

Bakker, A. B. (2011). An Evidence-Based Model of Work Engagement. *Current Directions in Psychological Science*, *20*(4), 265–269. https://doi.org/10.1177/0963721411414534

Bakker, A. B., & Bal, P. M. (2010). Weekly work engagement and performance: A study among starting teachers. *Journal of Occupational and Organizational Psychology*, *83*, 189-206.

Bakker, A. B., & Albrecht, S. (2018). Work engagement: Current trends. *Career Development International*, *23*(1), 4–11. https://doi.org/10.1108/CDI-11-2017-0207

Bakker, A. B., & Demerouti, E. (2008). Towards a model of work engagement. *Career Development International*, *13*(3), 209–223. https://doi.org/10.1108/13620430810870476

Bakker, A. B., & Demerouti, E. (2017). Job demands–resources theory: Taking stock and looking forward. *Journal of Occupational Health Psychology*, *22*(3), 273–285. https://doi.org/10.1037/ocp0000056

Barrick, M. R., Mount, M. K., & Judge, T. A. (2001). Personality and Performance at the Beginning of the New Millennium: What Do We Know and Where Do We Go Next? *International Journal of Selection and Assessment*, *9*(1–2), 9–30. https://doi.org/10.1111/1468-2389.00160

Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology*, *74*(5), 1252–1265. https://doi.org/10.1037/0022-3514.74.5.1252

Baumeister, R. F., Muraven, M., & Tice, D. M. (2000). Ego Depletion: A Resource Model of Volition, Self-Regulation, and Controlled Processing. *Social Cognition*, *18*(2), 130–150. https://doi.org/10.1521/soco.2000.18.2.130

Beal, D. J., Weiss, H. M., Barros, E., & MacDermid, S. M. (2005). An Episodic Process Model of Affective Influences on Performance. *Journal of Applied Psychology*, *90*(6), 1054–1068. https://doi.org/10.1037/0021-9010.90.6.1054

Becker, T. E., & Kernan, M. C. (2003). Matching commitment to supervisors and organizations to in-role and extra-role performance. *Human Performance, 16*(4), 327-348.

Belanger, F., & Collins, R. W. (1998). Distributed Work Arrangements: A Research Framework. *The Information Society*, *14*(2), 137–152. https://doi.org/10.1080/019722498128935

Bennett, A. A., Bakker, A. B., & Field, J. G. (2018). Recovery from work-related effort: A meta-analysis. *Journal of Organizational Behavior*, *39*(3), 262–275. https://doi.org/10.1002/job.2217

Bennett, A. A., Gabriel, A. S., & Calderwood, C. (2020). Examining the interplay of micro-break durations and activities for employee recovery: A mixed-methods investigation. *Journal of Occupational Health Psychology*, *25*(2), 126–142. https://doi.org/10.1037/ocp0000168

Benton, D. (1990). The impact of increasing blood glucose on psychological functioning. *Biological Psychology*, *30*(1), 13–19. https://doi.org/10.1016/0301-0511(90)90087-D

Biwer, F., Wiradhany, W., Oude Egbrink, M. G. A., & De Bruin, A. B. H. (2023). Understanding effort regulation: Comparing 'Pomodoro' breaks and self-regulated breaks. *British Journal of Educational Psychology*, *93*(S2), 353–367. https://doi.org/10.1111/bjep.12593

Boonzaier, B., Ficker, B., & Rust, B. (2001). A review of research on the Job Characteristics Model and the attendant job diagnostic survey. *South African Journal of Business Management*, *32*(1), 11–34. https://doi.org/10.4102/sajbm.v32i1.712

Borman, W. C., White, L. A., & Dorsey, D. W. (1995). Effects of ratee task performance and interpersonal factors on supervisor and peer performance ratings. *Journal of Applied Psychology*, *80*(1), 168–177. https://doi.org/10.1037/0021-9010.80.1.168

Bosch, C., & Sonnentag, S. (2019). Should I take a break? A daily reconstruction study on predicting micro-breaks at work. *International Journal of Stress Management*, *26*(4), 378–388. https://doi.org/10.1037/str0000117

Campbell, J. P. (1990). Modeling the performance prediction problem in industrial and organizational psychology. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of Industrial and Organizational Psychology* (pp. 687–732). Palo Alto, CA: Consulting Psychologists Press, Inc.

Carson, J. W., Carson, K. M., Gil, K. M., & Baucom, D. H. (2004). Mindfulness-based relationship enhancement. *Behavior Therapy*, *35*(3), 471–494. https://doi.org/10.1016/S0005-7894(04)80028-5

Chan, P. H. H., Howard, J., Eva, N., & Tse, H. H. M. (2022). A systematic review of at-work recovery and a framework for future research. *Journal of Vocational Behavior*, *137*, 103747. https://doi.org/10.1016/j.jvb.2022.103747

Cho, E. (2020). Examining boundaries to understand the impact of COVID-19 on vocational behaviors. *Journal of Vocational Behavior*, *119*, 103437. https://doi.org/10.1016/j.jvb.2020.103437

Cho, S., & Kim, S. (2022). Does a healthy lifestyle matter? A daily diary study of unhealthy eating at home and behavioral outcomes at work. *Journal of Applied Psychology*, *107*(1), 23–39. https://doi.org/10.1037/apl0000890

Chong, S., Kim, Y. J., Lee, H. W., Johnson, R. E., & Lin, S.-H. (Joanna). (2020). Mind your own break! The interactive effect of workday respite activities and mindfulness on employee outcomes via affective linkages. *Organizational Behavior and Human Decision Processes*, *159*, 64–77. https://doi.org/10.1016/j.obhdp.2019.11.001

Christian, M. S., Garza, A. S., & Slaughter, J. E. (2011). Work Engagement: A Quantitative Review and test of its relations with task and contextual performance. *Personnel Psychology*, *64*(1), 89–136. https://doi.org/10.1111/j.1744-6570.2010.01203.x

Cirillo, F. (2018). *The Pomodoro technique: The acclaimed time management system that has transformed how we work* (First edition). Currency.

Coffeng, J. K., Van Sluijs, E. M., Hendriksen, I. J. M., Van Mechelen, W., & Boot, C. R. L. (2015). Physical Activity and Relaxation During and After Work are Independently Associated With the Need for Recovery. *Journal of Physical Activity and Health*, *12*(1), 109–115. https://doi.org/10.1123/jpah.2012-0452

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd Edn.). Lawrence Earlbaum Associates.

Cooper, C. D., & Kurland, N. B. (2002). Telecommuting, professional isolation, and employee development in public and private organizations. *Journal of Organizational Behavior*, *23*(4), 511–532. https://doi.org/10.1002/job.145

Corbeanu, A., & Iliescu, D. (2023). The Link Between Work Engagement and Job Performance: A Meta-Analysis. *Journal of Personnel Psychology*, *22*(3), 111–122. https://doi.org/10.1027/1866-5888/a000316

Cropley, M., Weidenstedt, L., Leick, B., & Sütterlin, S. (2023). Working from home during lockdown: The association between rest breaks and well-being. *Ergonomics*, *66*(4), 443–453. https://doi.org/10.1080/00140139.2022.2095038

Dababneh, A. J., Swanson, N., & Shell, R. L. (2001). Impact of added rest breaks on the productivity and well being of workers. *Ergonomics*, *44*(2), 164–174. https://doi.org/10.1080/00140130121538

Deci, E. L., & Ryan, R. M. (2000). The “What” and “Why” of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Demerouti, E., & Cropanzano, R. (2010). From thought to action: Employee work engagement and job performance. In A. Bakker & M. Leiter. (Eds), *Work engagement: A handbook of essential theory and research*. Psychology Press.

Demerouti, E. (2023). Effective employee strategies for remote working: An online self-training intervention. *Journal of Vocational Behavior*, *142*, 103857. https://doi.org/10.1016/j.jvb.2023.103857

Demerouti, E., Bakker, A. B., Geurts, S. A. E., & Taris, T. W. (2009). Daily recovery from work-related effort during non-work time. In S. Sonnentag, P. L. Perrewé, & D. C. Ganster (Eds.), *Research in Occupational Stress and Well-being* (Vol. 7, pp. 85–123). Emerald Group Publishing Limited. https://doi.org/10.1108/S1479-3555(2009)0000007006

DeNisi, A. S., & Shaw, J. B. (1977). *Investigation of the uses of self-reports of abilities. Journal of Applied Psychology*, *62*(5), 641.

DeVaro, J., Li, R., & Brookshire, D. (2007). Analysing the job characteristics model: New support from a cross-section of establishments. *The International Journal of Human Resource Management*, *18*(6), 986–1003. https://doi.org/10.1080/09585190701321211

Di Martino, V., & Wirth, L. (1990). Telework: A new way of working and living. *International Labour Review*, *129*(5), 529–554.

Ding, L., Velicer, W. F., & Harlow, L. L. (1995). Effects of estimation methods, number of indicators per factor, and improper solutions on structural equation modeling fit indices. *Structural Equation Modeling: A Multidisciplinary Journal*, *2*(2), 119–143. https://doi.org/10.1080/10705519509540000

Donovan, J. J., & Radosevich, D. J. (1999). A meta-analytic review of the distribution of practice effect: Now you see it, now you don't. *Journal of Applied Psychology*, *84*(5), 795–805. https://doi.org/10.1037/0021-9010.84.5.795

Douglas, B. D., Ewell, P. J., & Brauer, M. (2023). Data quality in online human-subjects research: Comparisons between MTurk, Prolific, CloudResearch, Qualtrics, and SONA. *PLOS ONE*, *18*(3), e0279720. https://doi.org/10.1371/journal.pone.0279720

Durán, M. A., Extremera, N., & Rey, L. (2010). Analyzing the Contribution of Emotional Intelligence and Core Self-evaluations as Personal Resources to Employee Engagement. In S. L. Albrecht (Ed.), *Handbook of Employee Engagement*. Edward Elgar Publishing. https://doi.org/10.4337/9781849806374.00024

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, *62*(1), 107–115. https://doi.org/10.1111/j.1365-2648.2007.04569.x

Etzion, D., Eden, D., & Lapidot, Y. (1998). Relief from job stressors and burnout: Reserve service as a respite. *Journal of Applied Psychology*, *83*(4), 577–585. https://doi.org/10.1037/0021-9010.83.4.577

Evans, A. M., Meyers, M. C., De Calseyde, P. P. F. M. V., & Stavrova, O. (2022). Extroversion and Conscientiousness Predict Deteriorating Job Outcomes During the COVID-19 Transition to Enforced Remote Work. *Social Psychological and Personality Science*, *13*(3), 781–791. https://doi.org/10.1177/19485506211039092

Felstead, A., & Henseke, G. (2017). Assessing the growth of remote working and its consequences for effort, well-being and work-life balance. *New Technology, Work and Employment*, *32*(3), 195–212. https://doi.org/10.1111/ntwe.12097

Fitzer, M. M. (1997). Managing from Afar: Performance and Rewards in a Telecommuting Environment. *Compensation & Benefits Review*, *29*(1), 65–73. https://doi.org/10.1177/088636879702900110

Fouad, N. A. (2020). Editor in chief's introduction to essays on the impact of COVID-19 on work and workers. *Journal of Vocational Behavior*, *119*, Article 103441

Fredrickson, B. L. (1998). What Good Are Positive Emotions? *Review of General Psychology*, *2*(3), 300–319. https://doi.org/10.1037/1089-2680.2.3.300

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American*

Psychologist, *56*(3), 218–226. https://doi.org/10.1037/0003-066X.56.3.218

Fredrickson, B. L. (2003). The value of positive emotions: The emerging science of positive psychology is coming to understand why it's good to feel good. *American Scientist*, *91*(4), 330-335.

Fredrickson, B. L. (2013). Positive Emotions Broaden and Build. In *Advances in Experimental Social Psychology* (Vol. 47, pp. 1–53). Elsevier. https://doi.org/10.1016/B978-0-12-407236-7.00001-2

Fried, Y., & Ferris, G. R. (1987). The validity of the job characteristics model: A review and meta-analysis. *Personnel Psychology*, *40*(2), 287–322. https://doi.org/10.1111/j.1744-6570.1987.tb00605.x

Fritz, C., & Sonnentag, S. (2005). Recovery, Health, and Job Performance: Effects of Weekend Experiences. *Journal of Occupational Health Psychology*, *10*(3), 187–199. https://doi.org/10.1037/1076-8998.10.3.187

Fritz, C., & Sonnentag, S. (2006). Recovery, well-being, and performance-related outcomes: The role of workload and vacation experiences. *Journal of Applied Psychology*, *91*(4), 936–945. https://doi.org/10.1037/0021-9010.91.4.936

Fritz, C., Lam, C.F., & Spreitzer, G.M. (2011). It's the little things that matter: An examination of knowledge workers' energy management. *Academy of Management Perspectives*, *25*(3), 28-39.

Gagné, M. (2003). The Role of Autonomy Support and Autonomy Orientation in Prosocial Behavior Engagement. *Motivation and Emotion*, *27*(3), 199–223. https://doi.org/10.1023/A:1025007614869

Gailliot, M. T., Baumeister, R. F., DeWall, C. N., Maner, J. K., Plant, E. A., Tice, D. M., Brewer, L. E., & Schmeichel, B. J. (2007). Self-control relies on glucose as a limited energy source: Willpower is more than a metaphor. *Journal of Personality and Social Psychology*, *92*(2), 325–336. https://doi.org/10.1037/0022-3514.92.2.325

Gartner. (April 14, 2020). *HR survey reveals 41% of employees likely to work remotely at least some of the time post coronavirus pandemic* [Press Release]. https://www.gartner.com/en/newsroom/press-releases/2020-04-14-gartner-hr-survey-reveals-41--of-employees-likely-to-

Gajendran, R. S., & Harrison, D. A. (2007). The good, the bad, and the unknown about telecommuting: Meta-analysis of psychological mediators and individual consequences. *Journal of Applied Psychology*, *92*(6), 1524–1541. https://doi.org/10.1037/0021-9010.92.6.1524

George, J. M. (1991). State or trait: Effects of positive mood on prosocial behaviors at work. *Journal of Applied Psychology*, *76*(2), 299–307. https://doi.org/10.1037/0021-9010.76.2.299

Geurts, S. A., & Sonnentag, S. (2006). Recovery as an explanatory mechanism in the relation between acute stress reactions and chronic health impairment. *Scandinavian Journal of Work, Environment & Health*, *32*(6), 482–492. https://doi.org/10.5271/sjweh.1053

Gilson, L. L., Maynard, M. T., Jones Young, N. C., Vartiainen, M., & Hakonen, M. (2015). Virtual Teams Research: 10 Years, 10 Themes, and 10 Opportunities. *Journal of Management*, *41*(5), 1313–1337. https://doi.org/10.1177/0149206314559946

Golden, T. D., Veiga, J. F., & Dino, R. N. (2008). The impact of professional isolation on teleworker job performance and turnover intentions: Does time spent teleworking, interacting face-to-face, or having access to communication-enhancing technology matter? *Journal of Applied Psychology*, *93*(6), 1412–1421. https://doi.org/10.1037/a0012722

Gorgievski, M. J., & Hobfoll, S. E. (2008). Work can burn us out or fire us up: Conservation of resources in burnout and engagement. In J. R. B. Halbesleben (Ed.), *Handbook of stress and burnout in health care* (pp. 1–22). Hauppauge , NY : Nova Science Publishers.

Grant, A. M., Fried, Y., Parker, S. K., & Frese, M. (2010). Putting job design in context: Introduction to the special issue: PUTTING JOB DESIGN IN CONTEXT. *Journal of Organizational Behavior*, *31*(2–3), 145–157. https://doi.org/10.1002/job.679

Grant, A. M., & Parker, S. K. (2009). 7 Redesigning Work Design Theories: The Rise of Relational and Proactive Perspectives. *Academy of Management Annals*, *3*(1), 317–375. https://doi.org/10.5465/19416520903047327

Gupta, V., Mittal, S., Ilavarasan, P. V., & Budhwar, P. (2022). Pay-for-performance, procedural justice, OCB and job performance: A sequential

mediation model. *Personnel Review*. https://doi.org/10.1108/PR-11-2021-0782

Hackman, J. R., & Oldham, G. R. (1975). Development of the Job Diagnostic Survey. *Journal of Applied Psychology*, *60*(2), 159–170. https://doi.org/10.1037/h0076546

Hackman, J. R., & Oldham, G. R. (1976). Motivation through the design of work: Test of a theory. *Organizational Behavior and Human Performance*, *16*, 250–279.

Hackman, J. R., & Oldham, G. R. (1980). *Work redesign*. Mass: Addison-Wesley

Hagger, M. S., Wood, C., Stiff, C., & Chatzisarantis, N. L. D. (2010). Ego depletion and the strength model of self-control: A meta-analysis. *Psychological Bulletin*, *136*(4), 495–525. https://doi.org/10.1037/a0019486

Halbesleben, J. R. B., & Wheeler, A. R. (2008). The relative roles of engagement and embeddedness in predicting job performance and intention to leave. *Work & Stress*, *22*(3), 242–256. https://doi.org/10.1080/02678370802383962

Halbesleben, J. R. B. (2010). A meta-analysis of work engagement: Relationships with burnout, demands, resources, and consequences. In A. B. Bakker (Ed.) & M. P. Leiter, *Work engagement: A handbook of essential theory and research* (pp. 102–117). Psychology Press.

Hallbeck, M. S., Lowndes, B. R., Bingener, J., Abdelrahman, A. M., Yu, D., Bartley, A., & Park, A. E. (2017). The impact of intraoperative

microbreaks with exercises on surgeons: A multi-center cohort study. *Applied Ergonomics*, *60*, 334–341. https://doi.org/10.1016/j.apergo.2016.12.006

Harter, J. K., Schmidt, F. L., & Hayes, T. L. (2002). Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: A meta-analysis. *Journal of Applied Psychology*, *87*(2), 268–279. https://doi.org/10.1037/0021-9010.87.2.268

Häusser, J. A., Schlemmer, A., Kaiser, S., Kalis, A., & Mojzisch, A. (2014). The effects of caffeine on option generation and subsequent choice. *Psychopharmacology*, *231*(18), 3719–3727. https://doi.org/10.1007/s00213-014-3506-5

Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (Third edition). The Guilford Press.

Henning, R. A., Jacques, P., Kissel, G. V., Sullivan, A. B., & Alteras-Webb, S. M. (1997). Frequent short rest breaks from computer work: Effects on productivity and well-being at two field sites. *Ergonomics*, *40*(1), 78–91. https://doi.org/10.1080/001401397188396

Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist*, *44*(3), 513–524. https://doi.org/10.1037/0003-066X.44.3.513

Hobfoll, S. E. (2001). The Influence of Culture, Community, and the Nested-Self in the Stress Process: Advancing Conservation of Resources Theory.

Applied Psychology, *50*(3), 337–421. https://doi.org/10.1111/1464-0597.00062

Hobfoll, S. E., Halbesleben, J., Neveu, J.-P., & Westman, M. (2018). Conservation of Resources in the Organizational Context: The Reality of Resources and Their Consequences. *Annual Review of Organizational Psychology and Organizational Behavior*, *5*(1), 103–128. https://doi.org/10.1146/annurev-orgpsych-032117-104640

Hough, L. M., & Oswald, F. L. (2008). Personality Testing and Industrial–Organizational Psychology: Reflections, Progress, and Prospects. *Industrial and Organizational Psychology*, *1*(3), 272–290. https://doi.org/10.1111/j.1754-9434.2008.00048.x

Howe, D. C., Chauhan, R. S., Soderberg, A. T., & Buckley, M. R. (2021). Paradigm shifts caused by the COVID-19 pandemic. *Organizational Dynamics*, *50*(4), 100804. https://doi.org/10.1016/j.orgdyn.2020.100804

Humphrey, S. E., Nahrgang, J. D., & Morgeson, F. P. (2007). Integrating motivational, social, and contextual work design features: A meta-analytic summary and theoretical extension of the work design literature. *Journal of Applied Psychology*, *92*(5), 1332–1356. https://doi.org/10.1037/0021-9010.92.5.1332

Hunter, E. M., & Wu, C. (2016). Give me a better break: Choosing workday break activities to maximize resource recovery. *Journal of Applied Psychology*, *101*(2), 302–311. https://doi.org/10.1037/apl0000045

Hurtado, D. A., Nelson, C. C., Hashimoto, D., & Sorensen, G. (2015). Supervisors' Support for Nurses' Meal Breaks and Mental Health. *Workplace Health & Safety*, *63*(3), 107–115. https://doi.org/10.1177/2165079915571354

Idaszak, J. R., & Drasgow, F. (1987). A revision of the Job Diagnostic Survey: Elimination of a measurement artifact. *Journal of Applied Psychology*, *72*(1), 69–74. https://doi.org/10.1037/0021-9010.72.1.69

International Labor Organization. (2020). *An employers' guide on working from home in response to the outbreak of COVID-19.* https://www.ilo.org/actemp/publications/WCMS_745024/lang–en/index.htm

Jaramillo, F., Carrillat, F. A., & Locander, W. B. (2005). A meta-analytic comparison of managerial ratings and self-evaluations. *Journal of Personal Selling & Sales Management*, *25*(4), 315-328.

Johns, G., Xie, J. L., & Fang, Y. (1992). Mediating and Moderating Effects in Job Design. *Journal of Management*, *18*(4), 657–676. https://doi.org/10.1177/014920639201800404

Joseph, S., Linley, P. A., Harwood, J., Lewis, C. A., & McCollam, P. (2004). Rapid assessment of well-being: The Short Depression-Happiness Scale (SDHS). *Psychology and Psychotherapy: Theory, Research and Practice*, *77*(4), 463–478. https://doi.org/10.1348/1476083042555406

Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of Management Journal*, *33*(4), 692–724. https://doi.org/10.2307/256287

Karabinski, T., Haun, V. C., Nübold, A., Wendsche, J., & Wegge, J. (2021). Interventions for improving psychological detachment from work: A meta-analysis. *Journal of Occupational Health Psychology*, *26*(3), 224–242. https://doi.org/10.1037/ocp0000280

Kiburz, K. K. (2016). *A closer look into remote work: Examining resources within remote work arrangements with outcomes of job performance and work-family conflict*. (Doctoral dissertation). http://scholarcommons.usf.edu/etd/6275

Kim, S., Cho, S., & Park, Y. (2022). Daily microbreaks in a self-regulatory resources lens: Perceived health climate as a contextual moderator via microbreak autonomy. *Journal of Applied Psychology*, *107*(1), 60–77. https://doi.org/10.1037/apl0000891

Kim, S., Park, Y., & Headrick, L. (2018). Daily micro-breaks and job performance: General work engagement as a cross-level moderator. *Journal of Applied Psychology*, *103*(7), 772–786. https://doi.org/10.1037/apl0000308

Kim, S., Park, Y., & Niu, Q. (2017). Micro-break activities at work to recover from daily work demands: Micro-Break Activities. *Journal of Organizational Behavior*, *38*(1), 28–44. https://doi.org/10.1002/job.2109

Kim, W., Kolb, J. A., & Kim, T. (2013). The Relationship Between Work Engagement and Performance: A Review of Empirical Literature and a Proposed Research Agenda. *Human Resource Development Review*, *12*(3), 248–276. https://doi.org/10.1177/1534484312461635

Kline, R. B. (2023). *Principles and practice of structural equation modeling* (Fifth edition). The Guilford Press.

Knight, C., & Parker, S. K. (2021). How work redesign interventions affect performance: An evidence-based model from a systematic review. *Human Relations*, *74*(1), 69–104. https://doi.org/10.1177/0018726719865604

Knight, C., Patterson, M., & Dawson, J. (2017). Building work engagement: A systematic review and meta-analysis investigating the effectiveness of work engagement interventions: Effectiveness of Work Engagement Interventions. *Journal of Organizational Behavior*, *38*(6), 792–812. https://doi.org/10.1002/job.2167

Kolenikov, S., & Bollen, K. A. (2012). Testing Negative Error Variances: Is a Heywood Case a Symptom of Misspecification? *Sociological Methods & Research*, *41*(1), 124–167. https://doi.org/10.1177/0049124112442138

Koopmans, L., Bernaards, C., Hildebrandt, V., Van Buuren, S., Van Der Beek, A. J., & De Vet, H. C. W. (2012). Development of an individual work performance questionnaire. *International Journal of Productivity and Performance Management*, *62*(1), 6–28. https://doi.org/10.1108/17410401311285273

Koopmans, L., Bernaards, C. M., Hildebrandt, V. H., Schaufeli, W. B., De Vet, H. C. W. & Van Der Beek, A. J. (2011). Conceptual frameworks of individual work performance: A systematic review. *Journal of Occupational and Environmental Medicine*, *53*, 856–866.

Kossyva, D., Theriou, G., Aggelidis, V., & Sarigiannidis, L. (2023). Definitions and antecedents of engagement: A systematic literature review. *Management Research Review*, *46*(5), 719–738. https://doi.org/10.1108/MRR-01-2021-0043

Kramer, A., & Kramer, K. Z. (2020). The potential impact of the Covid-19 pandemic on occupational status, work from home, and occupational mobility. *Journal of Vocational Behavior*, *119*, 103442. https://doi.org/10.1016/j.jvb.2020.103442

Krumpal, I. (2013). Determinants of social desirability bias in sensitive surveys: A literature review. *Quality & Quantity*, *47*(4), 2025–2047. https://doi.org/10.1007/s11135-011-9640-9

Kühnel, J., Zacher, H., De Bloom, J., & Bledow, R. (2017). Take a break! Benefits of sleep and short breaks for daily work engagement. *European Journal of Work and Organizational Psychology*, *26*(4), 481–491. https://doi.org/10.1080/1359432X.2016.1269750

Lapierre, L. M., Van Steenbergen, E. F., Peeters, M. C. W., & Kluwer, E. S. (2016). Juggling work and family responsibilities when involuntarily working more from home: A multiwave study of financial sales

professionals. *Journal of Organizational Behavior*, *37*(6), 804–822. https://doi.org/10.1002/job.2075

Lazear, E. P., Shaw, K. L., & Stanton, C. T. (2015). The value of bosses. *Journal of Labor Economics*, *33*(4), 823-861.

Lazazzara, A., Tims, M., & De Gennaro, D. (2020). The process of reinventing a job: A meta–synthesis of qualitative job crafting research. *Journal of Vocational Behavior*, *116*, 103267. https://doi.org/10.1016/j.jvb.2019.01.001

Leach, D. J., Wall, T. D., & Jackson, P. R. (2003). The effect of empowerment on job knowledge: An empirical test involving operators of complex technology. *Journal of Occupational and Organizational Psychology*, *76*(1), 27–52. https://doi.org/10.1348/096317903321208871

Lee, K., & Allen, N. J. (2002). Organizational citizenship behavior and workplace deviance: The role of affect and cognitions. *Journal of Applied Psychology*, *87*(1), 131–142. https://doi.org/10.1037/0021-9010.87.1.131

Lehmann, G. (1962). Praktische Arbeitsphysiologie [Work physiology in practice]. Stuttgart: Thieme.

Lesener, T., Gusy, B., Jochmann, A., & Wolter, C. (2020). The drivers of work engagement: A meta-analytic review of longitudinal evidence. *Work & Stress*, *34*(3), 259–278. https://doi.org/10.1080/02678373.2019.1686440

Lisper, H.-O., & Eriksson, B. (1980). Effects of the length of a rest break and food intake on subsidiary reaction-time performance in an 8-hour driving task.

Journal of Applied Psychology, *65*(1), 117–122. https://doi.org/10.1037/0021-9010.65.1.117

Lyubykh, Z., Gulseren, D., Premji, Z., Wingate, T. G., Deng, C., Bélanger, L. J., & Turner, N. (2022). Role of work breaks in well-being and performance: A systematic review and future research agenda. *Journal of Occupational Health Psychology*, *27*(5), 470–487. https://doi.org/10.1037/ocp0000337

Mäkikangas, A., Juutinen, S., Mäkiniemi, J.-P., Sjöblom, K., & Oksanen, A. (2022). Work engagement and its antecedents in remote work: A person-centered view. *Work & Stress*, *36*(4), 392–416. https://doi.org/10.1080/02678373.2022.2080777

Martin, B. H., & MacDonnell, R. (2012). Is telework effective for organizations?: A meta-analysis of empirical research on perceptions of telework and organizational outcomes. *Management Research Review*, *35*(7), 602–616. https://doi.org/10.1108/01409171211238820

Marzuq, N., & Drach-Zahavy, A. (2012). Recovery during a short period of respite: The interactive roles of mindfulness and respite experiences. *Work & Stress*, *26*(2), 175–194. https://doi.org/10.1080/02678373.2012.683574

Maslach, C., Jackson, S. E. & Leiter, M. P. (1997). *Maslach Burnout Inventory*. Scarecrow Education.

Maslach, C., & Jackson, S. E. (1981). The measurement of experienced burnout. *Journal of Organizational Behavior*, *2*(2), 99–113. https://doi.org/10.1002/job.4030020205

Maynard, M. T., Mathieu, J. E., Gilson, L. L., R. Sanchez, D., & Dean, M. D. (2019). Do I Really Know You and Does It Matter? Unpacking the Relationship Between Familiarity and Information Elaboration in Global Virtual Teams. *Group & Organization Management*, *44*(1), 3–37. https://doi.org/10.1177/1059601118785842

Mazzetti, G., Robledo, E., Vignoli, M., Topa, G., Guglielmi, D., & Schaufeli, W. B. (2023). Work Engagement: A meta-Analysis Using the Job Demands-Resources Model. *Psychological Reports*, *126*(3), 1069–1107. https://doi.org/10.1177/00332941211051988

McFarland, L. A., Reeves, S., Porr, W. B., & Ployhart, R. E. (2020). Impact of the COVID-19 pandemic on job search behavior: An event transition perspective. *Journal of Applied Psychology*, *105*(11), 1207–1217. https://doi.org/10.1037/apl0000782

McLean, L., Tingley, M., Scott, R. N., & Rickards, J. (2001). Computer terminal work and the benefit of microbreaks. *Applied Ergonomics*, *32*(3), 225–237. https://doi.org/10.1016/S0003-6870(00)00071-5

Meade, A. W., & Craig, S. B. (2012). Identifying careless responses in survey data. *Psychological Methods*, *17*(3), 437–455. https://doi.org/10.1037/a0028085

Meijman, T. F., & Mulder, G. (1998). Psychological aspects of workload. In P. J. D. Drenth, H. Thierry, & C. J. de Wolff (Eds.), *Handbook of work and organizational: Work psychology* (pp. 5–33). Psychology Press/Erlbaum (UK) Taylor & Francis.

Moller, A. C., Deci, E. L., & Ryan, R. M. (2006). Choice and Ego-Depletion: The Moderating Role of Autonomy. *Personality and Social Psychology Bulletin*, *32*(8), 1024–1036. https://doi.org/10.1177/0146167206288008

Moorman, R. H., & Blakely, G. L. (1995). Individualism-collectivism as an individual difference predictor of organizational citizenship behavior. *Journal of Organizational Behavior*, *16*(2), 127–142. https://doi.org/10.1002/job.4030160204

Morgeson, F. P., Mitchell, T. R., & Liu, D. (2015). Event System Theory: An Event-Oriented Approach to the Organizational Sciences. *Academy of Management Review*, *40*(4), 515–537. https://doi.org/10.5465/amr.2012.0099

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, *126*(2), 247–259. https://doi.org/10.1037/0033-2909.126.2.247

Muraven, M. (1998). *Mechanisms of self-control failure: Motivation and limited resources*. Unpublished doctoral dissertation, Case Western Reserve University, Cleveland, Ohio.

Murphy, K. R. (1990). Job Performance and Productivity. In Murphy, K. R., & Saal, F. E. (Eds.). (1990). *Psychology in organizations: Integrating science and practice*. Lawrence Erlbaum Associates, Inc.

Murphy, K. R., Cleveland, J., & Hanscom, M. E. (2019). *Performance appraisal and management*. SAGE.

Pavey, L., Greitemeyer, T., & Sparks, P. (2011). Highlighting Relatedness Promotes Prosocial Motives and Behavior. *Personality and Social Psychology Bulletin*, *37*(7), 905–917. https://doi.org/10.1177/0146167211405994

Nakamura, J., & Csikszentmihalyi, M. (2014). The Concept of Flow. In M. Csikszentmihalyi, *Flow and the Foundations of Positive Psychology* (pp. 239–263). Springer Netherlands. https://doi.org/10.1007/978-94-017-9088-8_16

Nie, Q., Zhang, J., Peng, J., & Chen, X. (2023). Daily micro-break activities and workplace well-being: A recovery perspective. *Current Psychology*, *42*(12), 9972–9985. https://doi.org/10.1007/s12144-021-02300-7

Nilles, J. (1975). Telecommunications and Organizational Decentralization. *IEEE Transactions on Communications*, *23*(10), 1142–1147. https://doi.org/10.1109/TCOM.1975.1092687

OECD. (2020). *Productivity gains from teleworking in the post COVID-19 era: How can public policies make it happen?* (Issue July). https://read.oecd-library.org/view/?ref=135_135250-u15liwp4jd&title=Productivity-gains-from-teleworking-in-thepost-COVID-19-era

Oldham, G. R., & Hackman, J. R. (2010). Not what it was and not what it will be: The future of job design research: Future of job design research. *Journal of Organizational Behavior*, *31*(2–3), 463–479. https://doi.org/10.1002/job.678

Olson, M. H., & Primps, S. B. (1984). Working at Home with Computers: Work and Nonwork Issues. *Journal of Social Issues*, *40*(3), 97–112. https://doi.org/10.1111/j.1540-4560.1984.tb00194.x

Ones, D. S., Dilchert, S., Viswesvaran, C., & Judge, T. A. (2007). In support of personality assessments in organizational settings. *Personnel Psychology*, *60*(4), 995–1027. https://doi.org/10.1111/j.1744-6570.2007.00099.x

Organ, D. W., Podsakoff, P. M., & MacKenzie, S. B. (2006). *Organizational citizenship behavior: Its nature, antecedents, and consequences.* SAGE Publications, Inc., https://doi.org/10.4135/9781452231082

Owens, B. P., Baker, W. E., Sumpter, D. M., & Cameron, K. S. (2016). Relational energy at work: Implications for job engagement and job performance. *Journal of Applied Psychology*, *101*(1), 35–49. https://doi.org/10.1037/apl0000032

Paas, F., Van Gog, T., & Sweller, J. (2010). Cognitive Load Theory: New Conceptualizations, Specifications, and Integrated Research Perspectives. *Educational Psychology Review*, *22*(2), 115–121. https://doi.org/10.1007/s10648-010-9133-8

Palan, S., & Schitter, C. (2018). Prolific.ac—A subject pool for online experiments. *Journal of Behavioral and Experimental Finance*, *17*, 22–27. https://doi.org/10.1016/j.jbef.2017.12.004

Park, A. E., Zahiri, H. R., Hallbeck, M. S., Augenstein, V., Sutton, E., Yu, D., Lowndes, B. R., & Bingener, J. (2017). Intraoperative “Micro Breaks” With Targeted Stretching Enhance Surgeon Physical Function and Mental

Focus: A Multicenter Cohort Study. *Annals of Surgery*, *265*(2), 340–346. https://doi.org/10.1097/SLA.0000000000001665

Park, S. (2017). Motivating raters through work design: Applying the job characteristics model to the performance appraisal context. *Cogent Psychology*, *4*(1), 1287320. https://doi.org/10.1080/23311908.2017.1287320

Parker, S. K. (2014). Beyond Motivation: Job and Work Design for Development, Health, Ambidexterity, and More. *Annual Review of Psychology*, *65*(1), 661–691. https://doi.org/10.1146/annurev-psych-010213-115208

Parker, S. K., Morgeson, F. P., & Johns, G. (2017). One hundred years of work design research: Looking back and looking forward. *Journal of Applied Psychology*, *102*(3), 403–420. https://doi.org/10.1037/apl0000106

Parker, S. K., Wall, T. D., & Cordery, J. L. (2001). Future work design research and practice: Towards an elaborated model of work design. *Journal of Occupational and Organizational Psychology*, *74*(4), 413–440. https://doi.org/10.1348/096317901167460

Parker, K., Horowitz, J. & Minkin, R. (2022). *COVID-19 pandemic continues to reshape work in America*. Pew Research Center. https://www.pewresearch.org/social-trends/wp-content/uploads/sites/3/2022/02/PSDT_2.16.22_covid_work_report_clean.pdf

Parker, S. K., & Grote, G. (2022). Automation, Algorithms, and Beyond: Why Work Design Matters More Than Ever in a Digital World. *Applied Psychology*, *71*(4), 1171–1204. https://doi.org/10.1111/apps.12241

Pemble, S. D. (2020). *Factors Associated with Enhanced Productivity of Remote Workers: A Mixed Method Study*.

Phillips, S. (2020). Working through the pandemic: Accelerating the transition to remote working. *Business Information Review*, *37*(3), 129–134. https://doi.org/10.1177/0266382120953087

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Powers, T. (2020). *Working from home*. John Wiley & Sons, Inc.

Pronk, N. P. (2021). Implementing movement at the workplace: Approaches to increase physical activity and reduce sedentary behavior in the context of work. *Progress in Cardiovascular Diseases*, *64*, 17–21. https://doi.org/10.1016/j.pcad.2020.10.004

Prudential. (2021). *Pulse of the American worker survey: Is this working?* https://news.prudential.com/increasingly-workers-expect-pandemic-workplace-adaptations-to-stick.htm

Quinn, R. W., Spreitzer, G. M., & Lam, C. F. (2012). Building a Sustainable Model of Human Energy in Organizations: Exploring the Critical Role of

Resources. *Academy of Management Annals*, *6*(1), 337–396. https://doi.org/10.5465/19416520.2012.676762

Raghuram, S., Hill, N. S., Gibbs, J. L., & Maruping, L. M. (2019). Virtual Work: Bridging Research Clusters. *Academy of Management Annals*, *13*(1), 308–341. https://doi.org/10.5465/annals.2017.0020

Rapp, A., Ahearne, M., Mathieu, J., & Rapp, T. (2010). Managing sales teams in a virtual environment. *International Journal of Research in Marketing*, *27*(3), 213–224. https://doi.org/10.1016/j.ijresmar.2010.02.003

Reijseger, G., Schaufeli, W. B., Peeters, M. C. W. & Taris, T. W. (2013). Ready, set, go! A model of the relation between work engagement and work performance. In S. P. Gonçalves & J. G. Neves (Eds.), *Occupational health psychology: From burnout to well-being* (pp. 289–306). Rose Meadow: Scientific & Academic Publishing.

Roberts, B. W., Bogg, T., Walton, K. E., Chernyshenko, O. S., & Stark, S. E. (2004). *A lexical investigation of the lower-order structure of conscientiousness*. *Journal of Research in Personality*, *38*(2), 164-178.

Robinson, S. L., & Bennett, R. J. (1995). A TYPOLOGY OF DEVIANT WORKPLACE BEHAVIORS: A MULTIDIMENSIONAL SCALING STUDY. *Academy of Management Journal*, *38*(2), 555–572. https://doi.org/10.2307/256693

Roe, R. A. (1999). Work performance: A multiple regulation perspective. In C. L. Cooper & I. T. Robertson (Eds.), *International review of industrial and organizational psychology* (Vol. 14, pp. 231–335). Chichester, UK: Wiley

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software*, *48*(2). https://doi.org/10.18637/jss.v048.i02

Rost, E. A. (2022). The Association of Microbreaks with Work Performance: A Self-Determination Theory Perspective. (Doctoral Dissertation). https://vtechworks.lib.vt.edu/handle/10919/110109

Rudnicka, A., Cook, D., Cecchinato, M. E., Gould, S. J. J., Newbold, J. W., & Cox, A. L. (2022). The end of the active work break? Remote work, sedentariness and the role of technology in creating active break-taking norms. *2022 Symposium on Human-Computer Interaction for Work*, 1–13. https://doi.org/10.1145/3533406.3533409

Rudolph, C. W., Katz, I. M., Lavigne, K. N., & Zacher, H. (2017). Job crafting: A meta-analysis of relationships with individual differences, job characteristics, and work outcomes. *Journal of Vocational Behavior*, *102*, 112–138. https://doi.org/10.1016/j.jvb.2017.05.008

Rudolph, C. W., Allan, B., Clark, M., Hertel, G., Hirschi, A., Kunze, F., Shockley, K., Shoss, M., Sonnentag, S., & Zacher, H. (2021). Pandemics: Implications for research and practice in industrial and organizational psychology. *Industrial and Organizational Psychology*, *14*(1–2), 1–35. https://doi.org/10.1017/iop.2020.48

Saad, L. & Wigert, B. (2021). *Remote work persisting and trending permanent*. Gallup.com. https://news.gallup.com/poll/355907/remote-work-persisting-trending-permanent.aspx

Salanova, M., Schaufeli, W. B., Xanthopoulou, D., & Bakker, A. B. (2010). The gain spiral of resources and work engagement: Sustaining a positive worklife. In A. B. Bakker & M. P. Leiter (Eds.), *Work engagement: A handbook of essential theory and research* (pp. 118–131). Psychology Press.

Schaufeli, W. B., Salanova, M., González-romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness Studies*, *3*(1), 71–92. https://doi.org/10.1023/A:1015630930326

Shantz, A., Alfes, K., Truss, C., & Soane, E. (2013). The role of employee engagement in the relationship between job design and task performance, citizenship and deviant behaviours. *The International Journal of Human Resource Management*, *24*(13), 2608–2627. https://doi.org/10.1080/09585192.2012.744334

Shockley, K. (2014). *Telecommuting* [White paper]. Society for Industrial and Organizational Psychology. https://www.siop.org/Portals/84/docs/White%20Papers/ScientificAffairs/telecommuting.pdf

Shieh, G. (2011). Clarifying the role of mean centring in multicollinearity of interaction effects. *British Journal of Mathematical and Statistical Psychology*, *64*(3), 462–477. https://doi.org/10.1111/j.2044-8317.2010.02002.x

Shoshan, H. N., & Wehrt, W. (2022). Understanding “Zoom fatigue”: A mixed-method approach. *Applied Psychology*, *71*(3), 827–852. https://doi.org/10.1111/apps.12360

Singer, E., Thurn, D. R. V., & Miller, E. R. (1995). Confidentiality Assurances and Response: A Quantitative Review of the Experimental Literature. *Public Opinion Quarterly*, *59*(1), 66. https://doi.org/10.1086/269458

Singh, U., Ghadiri, A., Weimar, D., & Prinz, J. (2020). “Let’s have a break”: An experimental comparison of work-break interventions and their impact on performance. *Journal of Business Research*, *112*, 128–135. https://doi.org/10.1016/j.jbusres.2020.03.008

Sio, U. N., & Ormerod, T. C. (2009). Does incubation enhance problem solving? A meta-analytic review. *Psychological Bulletin*, *135*(1), 94–120. https://doi.org/10.1037/a0014212

Smither, R. (2004). Job analysis, design, and evaluation. In Spielberger C. D. (Ed.), *Encyclopedia of Applied Psychology* (pp. 449–456). Elsevier Science & Technology. https://doi.org/10.1016/B0-12-657410-3/00292-0

Sonnentag, S. (2001). Work, recovery activities, and individual well-being: A diary study. *Journal of Occupational Health Psychology*, *6*(3), 196–210. https://doi.org/10.1037/1076-8998.6.3.196

Sonnentag, S., Arbeus, H., Mahn, C., & Fritz, C. (2014). Exhaustion and lack of psychological detachment from work during off-job time: Moderator effects of time pressure and leisure experiences. *Journal of Occupational Health Psychology*, *19*(2), 206–216. https://doi.org/10.1037/a0035760

Sonnentag, S., & Bayer, U.V. (2005). Switching Off Mentally: Predictors and Consequences of Psychological Detachment From Work During Off-Job Time. *Journal of Occupational Health Psychology*, *10*(4), 393–414. https://doi.org/10.1037/1076-8998.10.4.393

Sonnentag, S., Cheng, B. H., & Parker, S. L. (2022). Recovery from Work: Advancing the Field Toward the Future. *Annual Review of Organizational Psychology and Organizational Behavior*, *9*(1), 33–60. https://doi.org/10.1146/annurev-orgpsych-012420-091355

Sonnentag, S., & Fritz, C. (2007). The Recovery Experience Questionnaire: Development and validation of a measure for assessing recuperation and unwinding from work. *Journal of Occupational Health Psychology*, *12*(3), 204–221. https://doi.org/10.1037/1076-8998.12.3.204

Sonnentag, S., Pundt, A., & Venz, L. (2017). Distal and proximal predictors of snacking at work: A daily-survey study. *Journal of Applied Psychology*, *102*(2), 151–162. https://doi.org/10.1037/apl0000162

Sonnentag, S., Venz, L., & Casper, A. (2017). Advances in recovery research: What have we learned? What should be done next? *Journal of Occupational Health Psychology*, *22*(3), 365–380. https://doi.org/10.1037/ocp0000079

Sonnentag, S., & Zijlstra, F. R. H. (2006). Job characteristics and off-job activities as predictors of need for recovery, well-being, and fatigue. *Journal of Applied Psychology*, *91*(2), 330–350. https://doi.org/10.1037/0021-9010.91.2.330

Steed, L. B., Swider, B. W., Keem, S., & Liu, J. T. (2021). Leaving Work at Work: A Meta-Analysis on Employee Recovery From Work. *Journal of Management*, *47*(4), 867–897. https://doi.org/10.1177/0149206319864153

Taris, T. W., & Schaufeli, W. B. (2015). Individual well-being and performance at work: A conceptual and theoretical overview. In M. van Veldhoven & R. Peccei (Eds.), *Well-being and performance at work*: *The role of context* (pp. 15–34). Psychology Press.

Tay, L., Batz-Barbarich, C., Yang, L. Q., & Wiese, C. W. (2023). Well-Being: The Ultimate Criterion for Organizational Sciences. *Journal of Business and Psychology*, *38*(6), 1141-1157.

Tims, M., & Bakker, A. B. (2010). Job crafting: Towards a new model of individual job redesign. *SA Journal of Industrial Psychology*, *36*(2), 9 pages. https://doi.org/10.4102/sajip.v36i2.841

Toscano, F., & Zappalà, S. (2021). Overall Job Performance, Remote Work Engagement, Living With Children, and Remote Work Productivity During the COVID-19 Pandemic: A Mediated Moderation Model. *European Journal of Psychology Open*, *80*(3), 133–142. https://doi.org/10.1024/2673-8627/a000015

Trougakos, J. P., Beal, D. J., Green, S. G., & Weiss, H. M. (2008). Making the Break Count: An Episodic Examination of Recovery Activities, Emotional Experiences, and Positive Affective Displays. *Academy of Management Journal*, *51*(1), 131–146. https://doi.org/10.5465/amj.2008.30764063

Trougakos, J. P., & Hideg, I. (2009). Momentary work recovery: The role of within-day work breaks. In S. Sonnentag, P. L. Perrewé, & D. C. Ganster (Eds.), *Research in Occupational Stress and Well-being* (Vol. 7, pp. 37–84). Emerald Group Publishing Limited. https://doi.org/10.1108/S1479-3555(2009)0000007005

Trougakos, J. P., Hideg, I., Cheng, B. H., & Beal, D. J. (2014). Lunch Breaks Unpacked: The Role of Autonomy as a Moderator of Recovery during Lunch. *Academy of Management Journal*, *57*(2), 405–421. https://doi.org/10.5465/amj.2011.1072

U.S. Census Bureau. (2022, September 15). *The number of people primarily working from home tripled between 2019 and 2021* [Press release]. https://www.census.gov/newsroom/press-releases/2022/people-working-from-home.html

Van Beek, I., Hu, Q., Schaufeli, W. B., Taris, T. W., & Schreurs, B. H. J. (2012). For Fun, Love, or Money: What Drives Workaholic, Engaged, and Burned-Out Employees at Work?: MOTIVATION AND WELL-BEING. *Applied Psychology*, *61*(1), 30–55. https://doi.org/10.1111/j.1464-0597.2011.00454.x

Van Der Heijden, B. I. J. M., & Nijhof, A. H. J. (2004). The value of subjectivity: Problems and prospects for 360-degree appraisal systems. *The International Journal of Human Resource Management*, *15*(3), 493–511. https://doi.org/10.1080/0958519042000181223

Van Wingerden, J., Derks, D., & Bakker, A. B. (2017). The Impact of Personal Resources and Job Crafting Interventions on Work Engagement and Performance. *Human Resource Management*, *56*(1), 51–67. https://doi.org/10.1002/hrm.21758

Vears, D. F., & Gillam, L. (2022). Inductive content analysis: A guide for beginning qualitative researchers. *Focus on Health Professional Education: A Multi-Professional Journal*, *23*(1), 111–127. https://doi.org/10.11157/fohpe.v23i1.544

Verbeke, A. (Ed.). (2008). *Growing the virtual workplace: The integrative value proposition for telework*. Edward Elgar.

Venkatesh, V., Ganster, D. C., Schuetz, S. W., & Sykes, T. A. (2021). Risks and rewards of conscientiousness during the COVID-19 pandemic. *Journal of Applied Psychology*, *106*(5), 643–656. https://doi.org/10.1037/apl0000919

Wall, T. D. (1995) Job design. In Nicholson, N. (Ed.) *Encyclopedic Dictionary of Organizational Behavior*. Cambridge, MA : Blackwell

Wall, T. D. & Parker, S. (2001). Psychology of job design. In Smelser, N. J. and Baltes, P. B. (Eds.), *International Encyclopedia of the Social & Behavioral Sciences*. Elsevier Science & Technology

Waltz, P. R. (2017). *Experiencing recovery at work: Energetic benefits of social media microbreaks* (Publication No. 10158924) [Doctoral dissertation, Northern Illinois University]. ProQuest Dissertations Publishing.

Wang, B., Liu, Y., Qian, J., & Parker, S. K. (2021). Achieving Effective Remote Working During the COVID-19 Pandemic: A Work Design Perspective. *Applied Psychology*, *70*(1), 16–59. https://doi.org/10.1111/apps.12290

Wang, H., Xu, G., Liang, C., & Li, Z. (2022). Coping with job stress for hospital nurses during the COVID-19 crisis: The joint roles of micro-breaks and psychological detachment. *Journal of Nursing Management*, *30*(7), 2116–2125. https://doi.org/10.1111/jonm.13431

Ward, M. K., & Meade, A. W. (2023). Dealing with Careless Responding in Survey Data: Prevention, Identification, and Recommended Best Practices. *Annual Review of Psychology*, *74*(1), 577–596. https://doi.org/10.1146/annurev-psych-040422-045007

Weiss, H. M., & Cropanzano, R. (1996). Affective Events Theory: A theoretical discussion of the structure, causes and consequences of affective experiences at work. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behavior: An annual series of analytical essays and critical reviews*, Vol. 18, pp. 1–74). Elsevier Science/JAI Press.

Wendsche, J., Lohmann-Haislah, A., & Wegge, J. (2016). Impact of supplementary short rest breaks on task performance – A meta-analysis. *Sozialpolitik.Ch*, *2/2016*. https://doi.org/10.18753/2297-8224-75

Westland, J. C. (2010). Lower bounds on sample size in structural equation modeling. *Electronic Commerce Research and Applications*, *9*(6), 476–487. https://doi.org/10.1016/j.elerap.2010.07.003

WHO. (2023, May 5). *Statement on the fifteenth meeting of the IHR (2005) Emergency Committee on the COVID-19 pandemic* [Press release]. https://www.who.int/news/item/05-05-2023-statement-on-the-fifteenth-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-coronavirus-disease-(covid-19)-pandemic

Wiernik, B. M., Hernandez, T., Volpone, S., Sabat, I., Ruggs, E., D'Mello, S., Eagleson, J., Dhanani, L., Poeppelman, T., Zelin, A. (2021). *Recommended Demographic Survey Items* [White paper]. Society for Industrial and Organizational Psychology.

Williams, L. J., & Anderson, S. E. (1991). Job satisfaction and organizational commitment as predictors of organizational citizenship and in-role behaviors. *Journal of Management*, *17*(3), 601-617.

Wontorczyk, A., & Rożnowski, B. (2022). Remote, Hybrid, and On-Site Work during the SARS-CoV-2 Pandemic and the Consequences for Stress and Work Engagement. *International Journal of Environmental Research and Public Health*, *19*(4), 2400. https://doi.org/10.3390/ijerph19042400

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2009). Work engagement and financial returns: A diary study on the role of job and personal resources. *Journal of Occupational and Organizational Psychology*, *82*(1), 183–200. https://doi.org/10.1348/096317908X285633

Yu, J., & Wu, Y. (2021). The Impact of Enforced Working from Home on Employee Job Satisfaction during COVID-19: An Event System

Perspective. *International Journal of Environmental Research and Public Health*, *18*(24), 13207. https://doi.org/10.3390/ijerph182413207

Zao Sanders, M. (2022). How Timeboxing Works and Why It Will Make You More Productive. *Harvard Business School Cases*, 1–838.

Zacher, H., Brailsford, H. A., & Parker, S. L. (2014). Micro-breaks matter: A diary study on the effects of energy management strategies on occupational well-being. *Journal of Vocational Behavior*, *85*(3), 287–297. https://doi.org/10.1016/j.jvb.2014.08.005

Zhang, C., Yu, M. C., & Marin, S. (2021). Exploring public sentiment on enforced remote work during COVID-19. *Journal of Applied Psychology*, *106*(6), 797–810. https://doi.org/10.1037/apl0000933

Zhu, Y., Zhang, L., Zhou, X., Li, C., & Yang, D. (2021). The impact of social distancing during COVID-19: A conditional process model of negative emotions, alienation, affective disorders, and post-traumatic stress disorder. *Journal of Affective Disorders*, *281*, 131–137. https://doi.org/10.1016/j.jad.2020.12.004

Zijlstra, F. (1993). *Efficiency in work behaviour: A design approach for modern tools*. Delft University Press.

Appendix A: Recruitment Materials, Information Sheets, Survey Measures, and Debrief Sheets

Recruitment Materials

Social Media

Hello everyone!

For my doctoral dissertation, I am conducting a research study to better understand experiences employees have when working remotely. As part of data collection for this study, I am looking for participants to complete an online survey via Qualtrics. This survey consists of questions related to remote work and some demographic questions (age, gender identity, race/ethnicity, job title, education level, employment status, hours per week worked, industry, and your current work arrangement - fully remote vs hybrid). It should take between 10-15 minutes to complete this survey.

I am not collecting any identifiable information, so your responses will remain anonymous and confidential. If you are interested and meet the eligibility criteria listed below, please use the provided survey link to complete the survey. While all the questions are related to different aspects of working remotely, the specific variables being measured and research question being investigated will be explained at the end of the survey via a debrief sheet. Thank you in advance for your time! I appreciate it.

Eligibility requirements:

- Over 18 years of age
- Must work a single job for 20 hours a week or more
- Must be allowed to work remotely for atleast a portion of those hours (i.e., have a hybrid or fully remote work arrangement)
- Must be fluent in English

Research team information:

- Principal Investigator: Jessica Jacob Chackoria
- Faculty Sponsor: Jane Halpert
- Institution where study is being conducted: DePaul University

Survey Link: https://depaul.qualtrics.com/jfe/form/SV_78JTr8TaH9FDtc2

Prolific

This online research study examines employee experiences related to remote work. While all the questions are related to different aspects of working remotely, the specific variables being measured and research question being investigated will be explained at the end of the survey via a debrief sheet. Please only sign up for this study if you are fluent in English, if you have at least one job that involves working for 20 hours a week or more and you are allowed to work remotely for at least a portion of those hours. If you agree to be in this study, you will complete an online survey about your experiences when working remotely as part of this job. You will also be asked to share some demographic data (age, gender identity, race/ethnicity, job title, education level, employment status, hours per week worked, industry, and your current work arrangement - fully remote vs hybrid). This study will take approximately 15 minutes to complete. You will receive $3 for your participation, upon full completion of the survey (this includes passing initial screening questions and successfully completing attention checks). For any questions or concerns about participating in this study, please email the Principal Investigator, Jessica Jacob Chackoria (jchackor@depaul.edu).
Faculty Sponsor: Jane Halpert. Institution where study is being conducted: DePaul University.

[This survey link was put into the appropriate field on Prolific]:
https://depaul.qualtrics.com/jfe/form/SV_b1v9fIKUqvCzM2O

Information Sheets

Social Media

INFORMATION SHEET FOR PARTICIPATION IN RESEARCH STUDY

REMOTE WORKER EXPERIENCES

Principal Investigator: Jessica Chackoria, Graduate Student, College of Science and Health

Institution: DePaul University, USA

Faculty Advisor: Jane Halpert, College of Science and Health

We are conducting a research study because we are trying to learn more about employees' experiences when working remotely.

We are asking you to be in the research because you are over 18, fluent in English, work a single job for atleast 20 hours a week, and are allowed to complete a portion of these hours remotely. If you agree to be in this study, you will be asked to

complete an online survey about your experiences when working remotely as part of this job. You will also be asked to share some demographic data (age, gender identity, race/ethnicity, job title, education level, employment status, hours per week worked, industry, and your current work arrangement - fully remote vs hybrid). The study should take 10-15 minutes to complete. Research data collected from you will be anonymous. So, we will not be able to link your responses back to you and they will remain confidential.

We are not able to tell you the complete details about the research right now, because we would not get good results if we did. The full details about the exact variables being measured and goal of the research study will be explained to you at the end of the survey.

You will not receive any compensation for participating in this research study. Your participation is voluntary, which means you can choose not to participate. There will be no negative consequences if you decide not to participate or change your mind later after you begin the study. You can withdraw your participation at any time prior to submitting your survey. If you change your mind later while answering the survey, you may simply exit the survey. Once you submit your responses, I will be unable to remove your data later from the study because all data is anonymous and I will not know which survey response belongs to you. Although unlikely, the primary risk in this study is that you may feel discomfort when answering questions about your feelings regarding work.

If you have questions, concerns, or complaints about this study or you want to get additional information or provide input about this research, please contact Jessica Chackoria (jchackor@depaul.edu). If you have questions about your rights as a research subject, you may contact Jessica Bloom in the Office of Research Services at 312-362-6168 or by email at jbloom8@depaul.edu. You may also contact DePaul's Office of Research Services if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.

You may print this information for your records.

By completing the survey, you are indicating your agreement to be in the research.

Please click on the arrow below to begin the survey.

Prolific

INFORMATION SHEET FOR PARTICIPATION IN RESEARCH STUDY

REMOTE WORKER EXPERIENCES

Principal Investigator: Jessica Chackoria, Graduate Student, College of Science and Health

Institution: DePaul University, USA

Faculty Advisor: Jane Halpert, College of Science and Health

We are conducting a research study because we are trying to learn more about employees' experiences when working remotely. We are asking you to be in the research because you are over 18, fluent in English, work a single job for atleast 20 hours a week, and are allowed to complete a portion of these hours remotely. If you agree to be in this study, you will be asked to complete an online survey about your experiences when working remotely as part of this job. You will also be asked to share some demographic data (age, gender identity, race/ethnicity, job title, education level, employment status, hours per week worked, industry, and your current work arrangement - fully remote vs hybrid). The study should take about 10-15 minutes to complete. You will be given $3 for participation in this. There is an attention check item embedded in this study. You will only be paid if you complete the study and answer the attention checks properly. You will be paid by Prolific per your contract with Prolific.

We are not able to tell you the complete details about the research right now, because we would not get good results if we did. The full details about the exact variables being measured and goal of the research study will be explained to you at the end of the survey, via a debrief sheet.

Research data collected from you will be anonymous to us. This is because we will only be collecting your Prolific ID, not your name or any other direct identifiers. We do not have access to a master list that can be used to link the Prolific ID to a single identity, and therefore we will be unable to ascertain the identity of the Prolific ID. So, your responses will remain confidential. Further, Prolific ID's will be permanently destroyed once compensation/incentive is provided.

Your participation is voluntary, which means you can choose not to participate. There will be no negative consequences if you decide not to participate or change your mind later after you begin the study. Although unlikely, the primary risk in this study is that you may feel discomfort when answering questions about your feelings regarding work.

Since you are enrolling in this research study through the Prolific site, we need to let you know that information gathered through Prolific is not completely anonymous. Any work performed on Prolific can potentially be linked to information about you on your Prolific public profile page, depending on the settings you have for your Prolific profile. Any linking of data by Prolific to your ID is outside of the control of the researcher for this study. We will not be accessing any identifiable information about you that you may have

put on your Prolific public profile page. We will store your Prolific ID separately from the other information you provide to us. Prolific has privacy policies of its own outlined for you in Prolific's privacy agreement. If you have concerns about how your information will be used by Prolific, you should consult them directly

If you have questions, concerns, or complaints about this study or you want to get additional information or provide input about this research, please contact Jessica Chackoria (jchackor@depaul.edu). If you have questions about your rights as a research subject, you may contact Jessica Bloom in the Office of Research Services at 312-362-6168 or by email at jbloom8@depaul.edu. You may also contact DePaul's Office of Research Services if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.

You may print this information for your records.

By completing the survey, you are indicating your agreement to be in the research.

Please click on the arrow below to begin the survey.

Screening Questions

Do you work a single job for at least 20 hours a week?

- Yes
- No

If "Yes" is selected

How many hours a week do you work at this job? _____

Can you work remotely for a portion of these hours?

- Yes
- No

If "No" is selected for either of these questions, they will not be allowed to proceed with the actual survey.

Main Survey

You have indicated that you work a single job for atleast 20 hours a week and that you complete some portion of those hours remotely. Please be thinking about the time you spend working remotely for this job as you answer the questions in this survey.

Remote Work Engagement

When I work remotely, I

1. Feel like I am bursting with energy
2. Am enthusiastic about my job
3. Am immersed in my work

Remote Work Performance

Task Performance

When I work remotely, I

1. Adequately complete assigned duties
2. Fulfill responsibilities specified in my job description.
3. Perform tasks that are expected of me.
4. Meet formal performance requirements of the job.
5. Engage in activities that directly impact my performance evaluation
6. Neglect aspects of the job that I am obligated to perform (R)
7. Fail to perform essential duties. (R)

Contextual Performance

How often do you do each of these behaviors as part of your job?

1. Go out of your way to help co-workers with work-related problems

2. Voluntarily help new employees settle into the job
3. Adjust your work schedule to accommodate other employees' requests for time-off
4. Go out of the way to make newer employees feel welcome in your work group
5. Show genuine concern and courtesy toward co-workers, even under the most trying business or personal situations

Microbreaks

Please recall short (lasting 10-minutes or less), informal breaks that you tend to take during the workday, when working remotely.

Rate the frequency with which you engage in each activity listed below during these breaks:

Relaxation Activities

1. Stretching, walking, or relaxing briefly
2. Daydreaming, gazing out the windows, taking a quick nap, or any other psychological relaxation

Nutrition-intake activities

1. Drinking caffeinated beverages (e.g., energy drinks, coffee, black or green tea)
2. Snacking (e.g., cookies) or drinking non-caffeinated beverages (e.g., juice, water, vitamin water)

Social activities

1. Chatting with coworkers on non-work related topics
2. Texting, using instant messenger, or calling to friends or family members
3. Checking personal SNS (e.g., Facebook, Twitter, or personal blogs)

Cognitive activities

1. Reading books, newspapers, or magazines for personal learning or entertainment
2. Surfing the Web for entertainment (e.g., watching short video clips, playing a game)

Job Design

Autonomy

1. I decide on my own how to go about doing the work.
2. The job gives me considerable opportunity for independence and freedom in how I do the work.
3. The job gives me a chance to use my personal initiative or judgment in carrying out the work.

Task Identity

1. I do a "whole" and identifiable piece of work. It is not a small part of the overall piece of work, which is finished by other people or by automatic machines.
2. The job is arranged so that I can do an entire piece of work from beginning to end.
3. The job provides me the chance to completely finish the piece of work I begin.

Skill Variety

1. The job requires me to do many different things, using a variety of my skills and talents.
2. The job requires me to perform a variety of tasks.
3. The job requires me to use a number of complex or high- level skills.

Task Significance

1. The results of my work significantly affect the lives and well-being of other people.
2. The job is one where a lot of other people can be affected by how well the work gets done.
3. The job itself is very significant and important in the broader scheme of things.

Feedback

1. The actual work itself provides clues about how well I am doing--aside from "feedback" co-workers or supervisors provide.
2. Just doing the work required by the job provides many chances for me to figure out how well I am doing.
3. When I finish a job, I know whether I performed well.

Well-being

Please read each statement and select the response that best describes how frequently you felt that way when working remotely:

1. Dissatisfied with life
2. Happy
3. Cheerless

4. Pleased with the way you are
5. Life was enjoyable
6. Life was meaningless

Conscientiousness

1. I get chores done right away.
2. I often forget to put things back in their proper place. (R)
3. I like order.
4. I make a mess of things. (R)

Comfort With Technology Use

I am comfortable with the tools that I need to use to communicate with coworkers, when I work remotely.

Experience With Remote Work

Response options: never, a few times a year or less, once a month or less, a few times a month, once a week, a few times a week, every day.

Prior to the social distancing policies associated with COVID-19, how often did you work from home?

Technology Reliance

When working remotely, on average, what percentage of your time do you spend on each of the activities listed below? (Note: Your response must sum to 100%)

- Doing individual work
- Using phone/videoconference calls to speak with coworkers
- Exchanging e-mails with coworkers
- Contributing to or accessing shared documents

- Using planning or scheduling tools (e.g., Outlook, Project, Asana)
- Using instant messaging/chats
- Using a 3-D virtual world to interact with coworkers (e.g., the meta verse)

Other Demographic Questions

Please enter your **age** in numbers: _____

Race/Ethnicity Option 1: Which of the following best defines your race or ethnicity? Select all that apply:

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Hispanic, Latino/a/é, or Spanish
- ☐ Middle Eastern or North African
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White
- ☐ Prefer to self-describe _____
- ☐ Prefer not to respond

Please choose one of the following to describe your **gender identity**:

- Cisgender man (assigned male at birth and currently identifying as male)
- Cisgender woman (assigned female at birth and currently identifying as female)
- Gender non-conforming

- Genderqueer or Non-binary
- Trans man
- Trans woman
- Prefer not to say
- Prefer to self-describe:

Please enter your **job title**: _____

How would you describe your **current work arrangement**?

- Fully Remote
- Hybrid (Partly in-person and partly remote)
- Fully In-person

If hybrid is chosen:

Please describe your hybrid work arrangement (e.g., 1 day remote and 4 days in office, or 3 weeks remote and 1 week in office)

How many breaks are you formally allowed to take? _____

What is the **highest degree** you have earned?

• High School Diploma

• Bachelor's Degree

• Master's Degree

• Doctoral Degree

• Other (please specify): _____

From the list provided, please indicate the **industry** that you currently work in (you can check more than 1):

- Accounting

- Advertising
- Aerospace/Aviation/Automotive
- Agriculture/Forestry/Fishing
- Biotechnology
- Business Services (Hotels, Lodging places)
- Computers (Hardware, Software, and Internet)
- Construction/Home Improvement
- Consulting
- Education
- Engineering/Architecture
- Entertainment/Recreation
- Finance/Banking/Insurance
- Food Service
- Government/Military
- Healthcare/Medical
- Legal
- Manufacturing
- Marketing/ Market Research/ Public Relations
- Media/ Printing/ Publishing
- Mining
- Non-profit
- Pharmaceutical/ Chemical

- Research/ Sciences
- Real Estate
- Retail
- Telecommunications
- Utilities
- Wholesale
- Transportation/ Distribution
- Other

Debrief Sheet

DEBRIEF:
Optimizing Remote Work Engagement and Performance: Exploring the Impact of Job Design Characteristics and Microbreaks

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Thank you for your participation in this research. This form is intended to provide additional context about the study you just completed. Please direct any questions you have regarding this study to the principal investigator, Jessica Chackoria (jchackor@depaul.edu).

In the survey, you were asked to respond to several questions about your job and experiences working remotely. This is because the goal of the study is to identify factors that optimize remote work outcomes (i.e., work engagement, performance, and well-being). Specifically, I want to test whether factors that have been found to be associated with better work outcomes in an in-person context, namely five job design characteristics (task identity, task significance, autonomy, skill variety, and feedback) and microbreaks (small breaks taken during the workday) are associated with better outcomes in a remote work context as well. The true purpose of the study and the variables being measured were not disclosed at the beginning of the study, because there is a chance that this knowledge could affect responses. The results of this study could have implications for designing remote jobs and developing policies and norms related to taking breaks.

If you have any questions or concerns about this research, please do not hesitate to contact:

- The principal investigator: Jessica Chackoria (JChackor@depaul.edu)
- Faculty advisor: Jane Halpert (Jhalpert@depaul.edu)

If you have any questions or concerns regarding your rights as a research subject, you may contact Jessica Bloom in the Office of Research Services at 312-362-6168 or by email (jbloom8@depaul.edu). You may also contact DePaul's Office of Research Services if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.

Thank you for your participation!

Appendix B: Results of Hypothesis Testing with Control Variables Included

Hypothesis 1a-e

Table B1

Multiple regression predicting performance using job design characteristics, with control variables

		DV = Task Performance (N = 439)		DV = Contextual Performance (N = 439)	
	Predictor	*β*	*SE (B)*	*β*	*SE (B)*
Focal	Task identity	0.08	0.02	0.05	0.36
Predictors	Task significance	0.10*	0.02	0.19***	0.04
	Autonomy	0.02	0.03	0.07	0.04
	Skill variety	0.06	0.03	0.07	0.04
	Feedback	-0.02	0.03	0.15**	0.05
Control	Conscientiousness	0.22*	0.02	-0.01	0.04
variables	Technology reliance	-0.05	0.00	0.24***	0.04
	Comfort with technology	0.22*	0.04	0.07	0.15
	Remote work experience	0.07	0.01	-0.01	0.06
	R^2	0.16		0.22	

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

Hypothesis 2

Table B2

Direct and Indirect effects (through remote work engagement) of job demand characteristics on task performance, with control variables included (N = 439)

		DV = Task Performance		DV = Contextual Performance	
	Predictor	Direct Effect *(SE)*	Indirect Effect *(SE)*	Direct Effect *(SE)*	Indirect Effect *(SE)*
Focal Predictors	Task identity	0.08 (0.02)	0.01 (0.01)	0.05 (0.04)	0.01 (0.01)
	Task significance	0.05 (0.02)	**0.05**** (0.01)	**0.16**** (0.04)	**0.04*** (0.01)
	Autonomy	-0.02 (0.03)	**0.04*** (0.01)	0.04 (0.05)	0.03 (0.01)
	Skill variety	0.05 (0.03)	0.02 (0.01)	0.07 (0.05)	0.01 (0.01)
	Feedback	-0.07 (0.02)	**0.06*** (0.01)	**0.13*** (0.05)	**0.04*** (0.01)
Control variables	Conscientiousness	**0.16**** (0.03)	—	-0.05 (0.04)	—
	Comfort with technology	**0.22**** (0.05)	—	0.07 (0.06)	—
	Technology reliance	-0.06 (0.09)	—	**0.25***** (0.15)	—
	Remote work experience	0.05 (0.01)	—	-0.03 (0.02)	—

Notes. All direct and indirect effects are standardized; Significant effects are bolded; Indirect effects for control variables were not specified in the model

Hypothesis 3a-d

Table B3

Multiple regression predicting performance using microbreak categories, with control variables included (*N* = 439)

		DV = Task Performance		DV = Contextual Performance	
	Predictor	*β*	*SE (B)*	*β*	*SE (B)*
Focal	Social	-0.07	0.03	0.09	0.06
Predictors	Cognitive	-0.12*	0.03	-0.17**	0.05
	Relaxation	0.01	0.03	-0.05	0.06
	Nutrition-based	0.04	0.03	0.05	0.05
Control	Conscientiousness	0.20***	0.02	0.01	0.04
variables	Technology reliance	-0.02	0.09	0.24***	0.16
	Comfort with technology	0.24***	0.04	0.12**	0.06
	Remote work experience	0.08	0.01	0.01	0.01
	R^2	0.16		0.12	

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

Hypothesis 4

Table B4

Direct and Indirect effects (through remote work engagement) of job demand characteristics on task performance, with control variables included (N = 439)

		DV = Task Performance		DV = Contextual Performance	
	Predictor	Direct Effect *(SE)*	Indirect Effect *(SE)*	Direct Effect *(SE)*	Indirect Effect *(SE)*
Focal Predictors	Social	-0.05 (0.04)	-0.03 (0.01)	0.12 (0.06)	-0.03 (0.02)
	Cognitive	-0.08 (0.03)	**-0.06**** (0.01)	**-0.13*** (0.05)	**-0.06**** (0.02)
	Relaxation	0.04 (0.03)	-0.03 (0.01)	-0.02 (0.05)	-0.03 (0.02)
	Nutrition-based	0.02 (0.03)	0.02 (0.01)	0.03 (0.05)	0.02 (0.02)
Control variables	Conscientiousness	**0.14**** (0.03)	—	-0.05 (0.04)	—
	Technology reliance	-0.04 (0.09)	—	**0.23***** (0.17)	—
	Comfort with technology	**0.22**** (0.06)	—	**0.10*** (0.06)	—
	Remote work experience	0.05 (0.01)	—	-0.01 (0.02)	—

Notes. All direct and indirect effects are standardized; Significant effects are bolded; Indirect effects for control variables were not specified in the model

Hypothesis 5

Table B5.

Table showing the index of moderated mediation for the interaction between each job design characteristic and frequency of microbreaks, with control variables

		Task Performance				Contextual Performance			
Model	Interaction Term	Index	SE	LL CI	UL CI	Index	SE	LL CI	UL CI
1	Identity X MB freq	0.022	0.01	-0.002	0.05	0.025	0.01	-0.002	0.05
2	Autonomy X MB freq	**0.028**	0.01	0.001	0.06	**0.031**	0.01	0.001	0.07
3	Variety X MB freq	0.012	0.01	-0.019	0.04	0.012	0.02	-0.02	0.05
4	Significance X MB freq	0.001	0.01	-0.01	0.03	0.008	0.01	-0.02	0.06
5	Feedback X MB freq	-0.016	0.01	-0.04	0.01	-0.012	0.01	-0.05	0.01

Note. The reported effects are not standardized; significant effects are in bold

Hypothesis 6a-e

Table B6

Multiple regression predicting well-being using job design characteristics, with control variables included (N = 439)

	Predictor	*β*	*SE*
Focal Predictors	Task identity	0.03	0.03
	Task significance	0.11*	0.04
	Autonomy	0.19***	0.04
	Skill variety	0.02	0.04
	Feedback	0.18***	0.04
Control variables	Conscientiousness	0.23***	0.04
	Technology reliance	0.06	0.13
	Comfort with technology	0.07	0.05
	Remote work experience	-0.06	0.01
	R^2	0.23	

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

Hypothesis 7a-d

Table B7

Multiple regression predicting well-being using types of microbreaks, with control variables included (N = 439)

	Predictor	*β*	*SE*
Focal Predictors	Social	0.10	0.05
	Cognitive	-0.22***	0.04
	Relaxation	-0.03	0.05
	Nutrition	0.04	0.04
Control variables	Conscientiousness	0.24***	0.04
	Technology reliance	0.05	0.14
	Comfort with technology	0.11*	0.06
	Remote work experience	-0.02	0.01
	R^2	0.14	

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

Hypothesis 8

Table B8.

Interactive effect between frequency of microbreaks and each job design characteristic on well-being (N = 439)

Model	Interaction Term	*β*	*SE*	*t*	*p*
1	Identity X MB freq	0.42	0.061	1.385	0.17
2	Autonomy X MB freq	0.44	0.07	1.30	0.20
3	Variety X MB freq	-0.13	0.07	0.39	0.70
4	Significance X MB freq	0.23	0.06	0.84	0.40
5	Feedback X MB freq	-0.30	0.06	1.01	0.31

Note: Every model consisted of seven predictors each (i.e.,, the displayed interaction term, frequency of microbreaks, and all five job design characteristics)