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Job complexity and learning opportunities: A silver lining in the design of global virtual work

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Abstract
A vast majority of research on global virtual work focuses on the struggles for workers as they navigate geographic, cultural, language, and time zone differences. Our research suggests that, despite these struggles, global virtual work may offer significant benefits to workers. We interviewed 78 engineers about their experiences of working globally and then surveyed 515 knowledge workers who worked either with globally distributed or exclusively collocated colleagues. Global virtual work was associated with workers' positive appraisal of the work's complexity and learning potential, which, in turn, improved innovation, satisfaction, and engagement. These effects, however, relied on workers' off-job recovery between workdays.
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> Global [virtual] work is full of challenges. It's never boring. The aspects that I see motivating in global work are the excitement of how we overcome small misunderstandings and other common challenges [of cross-cultural collaboration], witnessing the people from totally different cultural backgrounds getting together for a common goal and succeeding together. It's something that totally moves me forward. (Oliver, an Italian worker from a Finland-based MNC)

Global virtual work is challenging but, as the above quote from Oliver illustrates, the complexity of and opportunities associated with working across boundaries can also be exciting for workers. It is now standard practice for knowledge workers in multinational corporations (MNCs) to collaborate intensely with coworkers across locations and cultures using advanced communication technology to carry out interdependent tasks (e.g., Hinds, Liu, & Lyon, 2012; Stahl, Maznevski, Voigt, & Jonsen, 2010). Global virtual work has a number of positive drivers for MNCs, including the ability to leverage remote expertise, establish competitive advantage in a dynamic market, and realize cost savings (e.g., Cummings, 2004). At the same time, challenges abound for workers. Extensive research documents conflict, an absence of trust, and miscommunications in global virtual work along with frustration and stress associated with working across distance and differences. We, however, are more concerned about experiences such as Oliver's. In contrast to the current scholarly literature on global virtual work that mainly focuses on negative experiences, we attend to the positive aspects,

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for example, what engages and excites knowledge workers about global virtual collaboration, what provides day-to-day satisfaction in their work, and how does the design of the work affect these experiences?

Research based on positive organization scholarship (e.g., Cameron, Dutton, & Quinn, 2003) suggests that individuals naturally seek opportunities for growth, development of new skills, and affective gains in the roles in which they are engaged (Wayne, Grzywacz, Carlson, & Kacmar, 2007). Employees with a high growth need are shown to possess a strong interest in professional development and learning on the job (e.g., Shalley, Gilson, & Blum, 2009), and they tend to perceive challenging work demands as opportunities to position themselves for future gains, despite the potential stress (see Crawford, LePine, & Rich, 2010). The demands of global virtual work, including the challenges of coordinating work across geographic distance and cultures, may therefore increase the motivating potential of work because it provides opportunities for knowledge workers to have impact and grow professionally. Decades of research on work design support the idea that substantive job complexity – often equated with job enrichment (Pearce & Dunham, 1976) – increases employees' intrinsic motivation, positive attitudes (see Humphrey, Nahrgang, & Morgeson, 2007), and creative performance (Amabile, 1988; Oldham & Cummings, 1996). In our study, we apply a work design perspective as a counterpoint to the negative bias in studies of global virtual work and examine global virtual work as a potential motivating force for knowledge workers.

Work design research examines how work, tasks, and roles are structured, enacted, and modified to produce favorable individual and organizational outcomes (Grant & Parker, 2009). The dominant model of work design, the Job Characteristics Model (JCM; Hackman & Oldham, 1980), builds upon the job enrichment tradition, highlighting five core work design characteristics (skill variety, task significance, identity, autonomy, and feedback) that lead to positive work outcomes by creating critical psychological states in workers (i.e., experienced meaningfulness, experienced responsibility, and knowledge of results). Decades of empirical research provide both a detailed examination of and support for the proposed relationships between the core work (job) design characteristics and a multitude of favorable behavioral, attitudinal, and well-being outcomes, such as job satisfaction and reduced burnout (e.g., Fried & Ferris, 1987; Humphrey et al., 2007). Yet little research has examined how knowledge work is designed in the context of global virtual work.

Since the mid-twentieth century, when work design theories were introduced into management research, the nature of work has changed dramatically. Work has become more cognitively demanding and complex, working arrangements have become more flexible, teamwork is commonplace, and the composition of the workforce is more diverse (Oldham & Hackman, 2010). Unfortunately, work design theories have not kept pace with changes in modern-day work. The JCM, for example, which was originally designed for studying and enriching manufacturing and blue-collar jobs, assumes that employees work in a single location with their coworkers and managers (Oldham & Hackman, 2010). This simply is not true for many workers today. Employees often work in a different country than their employer's headquarters or than the coworkers with whom they work on a regular basis (Farrell, Laboissière, & Rosenfeld, 2006). Furthermore, most early research on work design assumed well-defined work with little interdependence or ambiguity, whereas current knowledge work is more likely to be ill-defined and require ongoing coordination with coworkers (Grant & Parker, 2009; Oldham & Hackman, 2010).

To answer Oldham and Hackman's (2010) call for addressing modern work and its effects on work design, we focus on global virtual work as a context for the design of knowledge work. Informed by interviews with 78 global R&D engineers and the extant literature related to work design and global virtual work, we propose hypotheses related to the design of global virtual work. We test the proposed model with survey data collected from 515 knowledge workers from a mix of occupations and industries.

THE DESIGN OF GLOBAL VIRTUAL WORK

In the international business literature, the term *global virtual work* (a term we use interchangeably with *global work*) refers to collaborative work that occurs among coworkers spread across different countries, often supported by technology mediated communication (Hinds et al., 2012; Stahl et al., 2010). Both geographic dispersion and the fact that workers occupy different cultural contexts have been found to complicate collaboration and to have negative rather than positive effects on employee experiences. Being embedded in different cultural contexts

often leads to misunderstandings (Carcia & Canado, 2005), incompatible ways of working (Cramton & Hinds, 2014), and conflicts among workers (Hinds & Mortensen, 2005), which can negatively affect workers' engagement (Au & Marks, 2012). Studies of the effects of geographic dispersion further report decreased job satisfaction and affective commitment (Baltes, Dickson, Sherman, Bauer, & LaGanke, 2002), feelings of isolation and role ambiguity (Hertel, Geister, & Konradt, 2005), breakdowns in trust (Polzer, Crisp, & Jarvenpaa, 2006), difficulties in knowledge sharing (e.g., Baba, Gluesing, Ratner, & Wagner, 2004; Cramton, 2001), power struggles across locations (e.g., Metiu, 2006), rampant misunderstandings (Piccoli & Ives, 2003), and high stress (Richter, Meyer, & Sommer, 2006).

Despite the dominant focus on problems associated with global virtual work, research also indicates that the design of virtual work can facilitate positive effects. Gibson, Gibbs, Stanko, Tesluk, and Cohen (2011), for example, found that distance from coworkers may enhance positive associations between perceived task significance and global workers' experienced meaningfulness. Team design characteristics, such as structural diversity, use of rich media, and structures that support coordination are also found to promote team productivity across geographic and cultural distances (for reviews see Caya, Mortensen, & Pinsonneault, 2013; also Gilson, Maynard, Young, Vartiainen, & Hakonen, 2015). Hertel, Konradt, and Orlikowski (2004) further suggest that common goals, high task interdependence, and team-based rewards increase distributed team members' work motivation. Inspired by this work, we draw on work design theories to explore whether or not the challenge of working globally may, in fact, have a silver lining. We ask whether the experiences of global workers can be positive rather than negative when work is designed to provide positive challenges and fuel motivation. In particular, we consider the role of job complexity in global virtual work.

In the work design literature, job complexity is seen as a motivating feature of work, especially for those with high growth need strength, like knowledge workers, because complex jobs are mentally challenging and require the worker to use advanced skills (e.g., Campbell, 1988; Morgeson & Humphrey, 2006). This need fulfillment, in turn, motivates employees to perform at a higher level in their jobs (Deci, Connell, & Ryan, 1989). Humphrey et al.'s (2007) meta-analysis of 259 work design studies, including studies of knowledge workers, demonstrates that complex jobs that workers perceive as difficult to perform tend to increase job satisfaction, job involvement, and work performance.

According to the JCM (Hackman & Oldham, 1980), five core work characteristics (skill variety, autonomy, task identity, task significance, and feedback) comprise job complexity, which reflects the motivational potential of work. Although research on work characteristics and global work is scant, there is evidence that global virtual work may, in fact, increase skill variety, autonomy, and task significance. *Skill variety*, for example, may be higher because of the need to use cultural and language skills in cross-cultural collaboration (Barner-Rasmussen, Ehrnrooth, Koveshnikov, & Mäkelä, 2010). Skill variety may also be heightened by requirements to rely on communication media and the need for advanced coordination skills to work across distance and time zones (Hoch & Kozlowski, 2014). Distance from leaders and organizational support structures also may provide global workers with more *autonomy*, as leaders of teams that rarely meet face-to-face often have no choice but to distribute and delegate leadership functions and responsibilities to team members (Bell & Kozlowski, 2002). Global virtual work may also heighten employee perceptions of *task significance*, that is, "the degree to which the job has a substantial impact on the lives of other people" (Hackman & Oldham, 1980: 79). Indeed, evidence suggests that global workers may experience the task as the main source of work significance given potentially scarce social rewards in virtual collaborations (Gibson et al., 2011). Although not explicitly focused on work design, this body of research suggests the possibility that global virtual work could have features that heighten perceived complexity and increase motivational potential.

To explore the question of what positive benefits might exist for global virtual workers and how these jobs can be designed to increase positive behavioral, attitudinal, and well-being outcomes, we conducted a preliminary qualitative study in two MNCs. Our goal in this study was to develop an in-depth understanding of global workers' experiences, especially factors that promoted positive experiences and outcomes. We then used the findings from our qualitative analysis in tandem with existing theory to develop hypotheses about how work design, in the context of global virtual work, can affect workers' experiences and outcomes. In our main study, we test these hypotheses using a cross-sectional survey of 515 knowledge workers from a mix of industries

and compare the experience of global workers with the experience of workers whose collaborations are situated within a single site in the same country. We integrate findings from both studies to enhance our understanding of the positive potential in and job design for global virtual work.

STUDY 1: PRELIMINARY QUALITATIVE RESEARCH

We started by conducting an initial qualitative study to better understand knowledge workers' responses to global virtual work and the characteristics of those jobs. We interviewed 78 global R&D engineers in two Finland-based MNCs in different industries and at different times, between August and December 2012, and between January and March 2014, to gather rich and reliable data (Eisenhardt, 1989). "Telex" is a multinational telecommunications company and "Escel" is an international engineering and service company. Both are headquartered in Finland and employ more than 40,000 employees worldwide. The R&D engineers we interviewed worked in teams composed of members from China, the United States, India, Italy, France, Germany, and/or Finland. Interviews lasted 60–90 min, were conducted face-to-face, audio-recorded with informants' consent, and transcribed verbatim for qualitative analysis. Most (66 of 78) of our interviewees were Finnish, four were Indian, two Italian, two French, one British, one Malaysian, one Romanian, and one Spanish. All informants were highly educated with university degrees, and nearly half of them ($n = 36$) had extensive work experience (over 10 years of experience in global virtual work in the company). The work of the R&D engineers in Telex included designing and developing software and information systems together with team members located in Asia, Europe, and the US. Escel R&D engineers developed new engineering solutions and applications starting from basic research through to product development and implementation with European, Chinese, Indian, and US-based teammates. Ninety percent of our interviewees held a technical expert position without staff. Ten percent worked in a managerial role leading a global virtual team. The first author, a native Finnish speaker using English as a second language, interviewed the Finnish engineers in Finnish and the remaining engineers in English. Our interview protocol included open-ended questions about engineers' perceptions of their work and how they experienced working in global virtual teams. We also asked about how they spent and experienced their free time and if and how they worked outside normal working hours.

All interviews were analyzed in the original language and, where needed, the first author translated Finnish quotations to English for inclusion in this article. She used her firsthand experience at the research sites for contextualizing the translations to convey the intended meaning of the original quotation (Chidlow, Plakoyiannaki, & Welch 2014). Our data analysis approach was inductive, meaning that we examined our data to identify potential themes and relationships between constructs of interest (Van Maanen, Sorensen, & Mitchell, 2007). The first step involved *open coding* in which the first author coded all of the data to identify dominant themes using ATLAS.ti, a software package designed for qualitative analysis of text. In open coding, it became evident that specific properties of global virtual work were perceived by the engineers to increase job complexity and that job complexity and learning opportunities were a source of motivation when collaborating across cultures and distance. Additionally, a theme emerged around the importance of off-job recovery to one's positive experience of global virtual work.[1] In the next step, we iterated with the literature and synthesized codes into *focused codes*. For example, we collapsed codes such as "empowerment," "ownership of the task," "overall responsibility," and "control of work" into a focused code called "autonomy." Similarly, we collapsed codes aligned with task significance, skill variety, feedback, and task identity, all of which are dimensions of job complexity and were present in our data. Learning opportunities included codes such as "learning from other experts" and "possibility to collaborate with the best experts" as well as "learning about other cultures." Finally, we had a set of codes, such as "resting after a work day," "detachment from work during free time," and "relaxing" that captured the role of off-job recovery. In *axial coding*, we continued to iterate between our data and existing research on work design and global virtual work until a clear and coherent set of relationships between global virtual work and employee experiences emerged.

Findings

The findings from our preliminary qualitative study suggest that global virtual work may indeed have benefits for knowledge workers. As suspected, informants described numerous examples of how global virtual work provided more skill variety, impact, and opportunities to set their own course. In addition, we discovered that learning opportunities were perceived as an important characteristic of

global virtual work. The engineers we interviewed spoke frequently about how their opportunities for learning were expanded as a result of working with talented engineers around the globe and working across cultures. It also emerged from our analysis that taking time to recover after the workday was important to experiencing job complexity and learning opportunities as positive characteristics of global virtual work.

Job complexity

A majority of the engineers (87%) we interviewed described global virtual work as highly motivating because of the challenge. Skill variety, task significance, and autonomy stood out as work characteristics that were heightened and appealed to engineers on global virtual projects. Collaborating across distance and cultural contexts required the engineers to use a wide variety of skills besides their task-related expertise – for example, language and cultural skills as well as task coordination skills. Anssi, a Finnish engineer at Telex, for example, described how he used his skills to "navigate in these cross-cultural minefields" when coordinating tasks with coworkers in China, Italy, India, and the US. He said:

> You are trying to take into consideration that people act in a different way in different places and that you cannot expect them to act in some given way. In fact, you have to understand what the best course of action in different locations is … and occasionally you get the experiences of success.

English language skills were mentioned by 61 of the 78 interviewed engineers as a central skill requirement when working globally. The English lingua franca was used in both Telex and Escel to make communication possible between global workers who did not share a native language. "I basically use [only] English at work," said Emma, a Finnish-native R&D engineer at Telex. "You cannot do this job without the English language skills," she continued. Cross-cultural settings demanded language proficiency skills from second-language English speakers, a demand not present in local work.

Global virtual work also was described as high in autonomy by most (68) of our interviewees. We were told that, when teams were dispersed in different locations, individual team members were required to manage their own tasks independently. The companies could not monitor globally distributed workers as they did local workers. Therefore global knowledge workers had both freedom and the responsibility to decide how to do their jobs. As Antti, a R&D engineer in a global Telex-project explained:

> We are constantly required to take responsibility for tasks, to decide which tasks make sense, if we should do them or not. When we are allowed to decide and think by ourselves what is the best way to do this work and what amazing innovations we can come up with, then these products become our own children and that's what makes this work so engaging.

Autonomy also meant that global workers were allowed to set their own schedules. Having a choice in deciding when and how one would work was empowering. Sanna, a member of a global team at Telex headquarters in Finland, said, "Autonomy makes you feel more empowered. It is essential in this kind of knowledge work. The fact that I can decide at what time I'll go to work, in which order I do everything … it's motivating." Sanna's team members were located in the US and Central Europe.

Task significance was also described as a typical feature of global virtual work by many (44) of the engineers we interviewed. They described global R&D projects as more vital for the focal companies' success than local projects because global projects were more likely to develop cutting-edge technology and products destined for worldwide markets while projects located exclusively within a single country concentrated on development and adaptation of technology to local markets. Petri, a software developer who worked in one of Telex's most critical projects with coworkers in all target markets, explained what it meant to develop potentially groundbreaking products. He said, "My motivation increases when I get to see the impact of my own work in the big picture. Now, we are developing [the Telex's signature product]. We are in a central position, in the focal point." The global scope of their work was experienced as challenging and exciting. Hannu, a Finnish Escel engineer, said, "Working in [this global project] is inspiring. Of course it's challenging, but I think it's much more imposing to develop something for global markets than just for Finnish markets." Hannu had worked for six years in global teams with US, Asian, and European coworkers. Although participating in global virtual work required more time investment due to time zone differences, most of our interviewees were willing to put in the extra effort and compromise a part of their free time for work. Many interviewees said that, despite the high demands of global virtual work, the feeling of making a difference for the organizations that employed them kept them motivated and excited about their work.

In sum, increased job complexity, especially skill variety, autonomy, and task significance, emerged as salient characteristics of global virtual work that our interviewees described as particularly motivating and engaging. We also saw evidence that getting feedback (41) and seeing one's work used (4) were important elements, although less prevalent in our data and less likely to be described as stronger features of global than local work.

Learning opportunities

One of the unanticipated themes that emerged in our analysis was the importance of learning, above and beyond the benefits of job complexity. Most interviewees (92%) cited extensive learning opportunities as a benefit they enjoyed in global virtual work. After working globally, our interviewees said that they no longer desired local roles because they did not want to forgo the growth opportunities to which they were exposed as global workers. As articulated by Lucas, a French Escel engineer who collaborated with people from nine different countries, "I would get bored if I would only deal with internal markets, because you will always learn something [in global virtual work]. So I really like it, and I don't want to change to a local role." Similarly, Samuel, a Finnish R&D engineer who worked with Chinese and Swiss coworkers, was inspired by the wide variety of learning opportunities that Escel's international environment provided. He said, "You have an unlimited number of opportunities to learn and grow professionally [in Escel's global R&D projects] … I find it really inspiring and motivating." Working in global projects provided the R&D engineers with many opportunities for on-the-job learning, which they perceived as contributing to the development of their professional competencies.

Engineers explained that, when working globally, they had opportunities to learn new technical skills from the most talented engineers around the world. As Maksim, a Romanian member of a global R&D team in Escel, said of global teams, "You can find really, really intelligent guys with a lot of experience around the world. It's very interesting to work with these really smart guys and learn from them." Learning from the most talented engineers and having opportunities to advance their skills drove many engineers in Escel and Telex to seize the chance to work in global teams. Learning about new cultures also opened employees' eyes to different ways of thinking, living, and working and made them think about peoples' behavior in new ways. As Nathan, a French R&D engineer with 12 years of global work experience at Escel, described:

> I'm very interested in what people do and how they react. The more [national] diversity we have in our team makes me more interested [in my work]. I'm always learning something new, and that's very attracting to me.

Cross-cultural learning opportunities, in addition to the opportunity to learn technical skills, were described as a desirable characteristic of global virtual work. Nearly all of the engineers we interviewed mentioned learning opportunities as a reason for their enthusiasm about their global roles.

Off-job recovery

Another strong theme in our interviews was the importance of being able to detach and recover from the demands of the day-to-day work. The high demands of global virtual work often contributed to the engineers we interviewed feeling exhausted. In order to recover from the job, they needed to rest, relax, and refrain from job-related activities and thoughts during non-work time. These recovery strategies were described by 70 interviewees as important for their well-being and work motivation. Recovery enabled them to replenish mental and physical resources between workdays and to perceive the challenges of global virtual work in a more positive manner. For example, Alvar, a Finnish software developer from Telex, said, "I have noticed that, if I haven't slept enough and if I'm really tired, I get easily stressed and view my work more negatively." He worked in a global project from 6 am to 8 am with Chinese colleagues, during business hours at the office in Helsinki and occasionally in the evenings at home coordinating with colleagues in the US. Alvar had learned that detachment from work in the evenings was essential for his ability to cope with the job demands on a day-to-day basis.

Busy project phases, however, required intensive task coordination and online communication with distant coworkers outside business hours. Therefore detachment from work was not easy in the evenings, and 26% of the interviewees reported insufficient recovery experiences during non-work time. When coworkers needed help on other continents, global workers felt a responsibility to respond to them during evening hours. Solving work-related problems at home, however, hindered interviewees' off-job recovery and sometimes interfered with sleep. As Daniel from Telex said, "When I have a scheduled [virtual] meeting in the evening, I cannot relax completely before that.

... The meetings usually end around midnight. I close the computer at 2 am when I'm calm enough to fall asleep." Workers who described effective recovery strategies found the work "inspiring" or rife with "learning opportunities," whereas workers who did not have enough recovery time felt that these same challenges were overwhelming, especially when they faced issues related to cross-cultural collaboration or coordination of work across geographic distance and time zones. In sum, our data revealed a paradox: The demands of global virtual work made recovery problematic, but well-recovered global workers were more optimistic in appraising the work as a positive challenge and opportunity for learning whereas those who were not able to recover perceived the work more pessimistically.

Off-job recovery strategies that helped the global workers we interviewed to relax and mentally detach from work during evenings included engaging in family activities, cooking, doing sports and other hobbies, switching off email and chat synchronization from smartphones, and using a private computer for browsing rather than the work computer in the evenings at home. Camping, long walks, visiting friends, and having a retreat enabled workers to revive during the weekends.

Table 1 provides additional quotations from our interviews in each of the above categories.

THEORY AND HYPOTHESES

In contrast to the dominant view of stress-prone global virtual work that emphasizes taxing and frustrating job demands, such as coordination across time zones, geographic distances, and incompatible cultures, our qualitative analysis revealed that global virtual work was often experienced as positively challenging and as an opportunity to learn. We also discovered that off-job recovery may be needed to facilitate workers' positive appraisal of the work. Based on our interviews and the management literature, we develop hypotheses related to the design of global virtual work.

Global Virtual Work and Perceived Job Complexity

Our qualitative data indicate that, in global virtual work, the complexity and motivational potential of knowledge work may be high. A fundamental principle of the motivational approach in the work design literature is that work can be made more motivating and satisfying by enriching job complexity with the core work design characteristics (Hackman & Oldham, 1980). By and large, empirical research is supportive of this contention (for a review see Humphrey et al., 2007). Job complexity has been treated both as an *objective* characteristic of work and as an individual's *perception*. We follow the latter approach, which emphasizes the individual's subjective psychological appraisals of work (Campbell, 1988). When, for example, work is demanding and, at the same time, offers potential for mastery and personal growth, it can be perceived as positively complex and challenging. When, however, an individual perceives his or her resources (i.e., energy, skills, or abilities) to be inadequate for coping with the situational demands, work may be appraised as threatening (Lazarus & Folkman, 1984).

Based on our interviews with global workers at Escel and Telex as well as evidence from research on global virtual work, we argue that global virtual work has the potential to be perceived as more complex than when working solely with collocated coworkers. Research on global virtual work extensively documents the challenges and demands for workers, such as the need to build trust across distance and differences (e.g., Polzer et al., 2006) and the requirement to resolve incompatible ways of working (e.g., Cramton & Hinds, 2014). This body of work, however, neglects the possibility that these demands may increase job complexity and motivational potential. Although they did not examine job complexity directly, one of the few studies to examine the design of global virtual work suggests that the task may take on more importance in distant work while the importance of social aspects recede (Gibson et al., 2011), suggesting that perceived task complexity could be higher. Our interviewees described their experience of global virtual work as more complex and motivating than local work because of the wide variety of skills on which they had to draw, the extent to which they were expected to make their own decisions, and the importance of the projects on which they were working. We, therefore, propose that global virtual work will be appraised as having greater job complexity than local collocated work.

Hypothesis 1: Global virtual work, as compared with local work, will be perceived as having greater job complexity.

Global Virtual Work and Perceived Learning Opportunities

Global virtual work may afford exposure to different types of people and unfamiliar experiences and demands and therefore provide more learning opportunities for knowledge workers than does local work.

Table 1 Example quotes for study 1 with number of instances coded

Topic	Evidence
Job complexity (380 coded instances)	"Communication challenges related to multicultural collaboration …. That motivates me quite much, trying to understand, dealing with [people with different cultural backgrounds]." (*skill variety*) "I have always been interested in China. Now I can use, and I'm officially required to use, my knowledge about Chinese culture, language, how people use our products in China in my work." (*skill variety*) "Some people may experience cultural differences as obstacles or stressors and think 'if only would this be less complicated,' but I'm lucky to see [global work as] an opportunity to use my cultural knowledge, more as an advantage than a burden." (*skill variety*) "Our manager told us, 'Boys, make decisions by yourselves and if you feel that you won't have the guts to do them, escalate upwards in the organization. But if you feel that you can decide how to do the work, do it and communicate it and [if something goes wrong] we'll clean up the mess together.'" (*autonomy*) "[I have felt especially motivated] when I have been able to create something new, when I have been empowered to be responsible for the whole task and I have had a freedom to do it as I see the best way to do." (*autonomy*) "In our [personnel survey], 90% of [global workers] said they had adequate autonomy in their work." (*autonomy*) "Working in [this global project] is inspiring. Of course it's challenging but I think it's much more imposing to develop something for global markets than just for Finnish market." (*task significance*) "[I prefer working] in a global position because it gives me 'a front row seat.' In a global role you are more in the core of activities [than in a local role], and I want to be involved in moving bigger things forward." (*task significance*)
Learning opportunities (144 coded instances)	"Global work environment is so rich in diversity, you get so much more out of it, you learn about new cultures, learn to understand how people live, think and value in different countries." "You will always learn something [in global work]." "There are always a lot of different things going on in a global organization, a lot to learn, interesting problems to solve, and many things to develop, which I experience as interesting." "A local role is not enough for me. … I want to have opportunities to learn." "I have learned to understand the Italian people better and also learned about us Finns from his [an Italian colleague's] perspective." "What I like in global work is also part of the stress; it's never repeating, and it's always learning from something new that's very attracting to me." "I could say that I have the privilege to work with the world's finest experts and in many respects deal with world class technologies. It's a privilege, magnificent opportunity to learn."
Off-job recovery (286 *coded instances*)	"In this kind of work, where you have to use all your brain capacity, it is important to have a family that pulls you out of thinking about work in the evenings and weekends." "It's not easy to forget about work [during the evenings]. I keep pondering how to solve certain [work-related] problems and so on." "I have switched off email synchronization from my cell phone to protect my well-being when I have noticed that I'm too stressed out." "I haven't auto-synced emails to my smartphone. I read my emails during the evenings and weekends if I want to do so. During the work week, I don't have any hobbies. I just work." "We spend the weekends in our cabin. I take the computer with me only if I have meetings scheduled for the weekend evenings [with coworkers in the US], but otherwise I usually leave it home." "We camp during the weekends. In the caravans camp, we have a totally different life. I can detach myself from work there even though some of my colleagues also have a caravan in the same camp. We have agreed with them that we won't talk about work stuff in the camp."

Our qualitative data support this reasoning, indicating that collaboration with global experts from different countries increased learning opportunities for the R&D engineers we studied. Our data suggest that some opportunities for learning may contribute to job complexity but there are also learning

opportunities for global virtual workers above and beyond simply demands for a wider range of skills, greater impact, and more autonomy. Interviewees, for example, emphasized the importance of learning from talented engineers around the globe and learning about new cultures.

Research on global virtual work has been relatively silent about learning opportunities. One exception is research that suggests that through site visits, global virtual workers can learn not only about the other site and culture, but also their own (Mortensen & Neeley, 2012). We can also turn to research on expatriate assignments, which suggests that opportunities to work overseas are desirable because they afford opportunities for learning (e.g., Stahl, Miller, & Tung, 2002; Tung, 1998). Tung (1998), for example, in a survey of expatriates in 49 US-based multinationals, found that respondents saw overseas assignments as an opportunity to learn skills and acquire experiences that would not have been possible in their home country. Tung summarizes that "skills that can be acquired abroad are viewed as contributing to the repertoire of core competences essential to the development of cosmopolitans" (Tung, 1998: 130), for example, managers who have a global perspective. Stahl and his colleagues (Stahl et al., 2002), in their study of 494 German expatriates in 59 countries, similarly found that learning opportunities were central in how expatriates thought about their overseas experience. In open-ended questions, 34% of respondents said that learning new skills during overseas assignments, including managerial skills, communication competence, intercultural skills, and improved language fluency, had a positive effect on their careers. Ninety-five percent of the respondents in their study indicated that the development of intercultural skills were likely or highly likely outcomes (84% named the development of professional and managerial skills). Osland (2000) also reports that expatriates develop an "addiction to novelty and learning," so much so that when repatriated they miss the opportunity to learn new things.

In addition to research suggesting that learning motivates people to engage in overseas assignments, there is evidence that expatriates adapt more successfully if the assignments enable them to learn. Black and Mendenhall (1990), for example, report that learning about the culture and culturally appropriate norms enhance expatriate adjustment. There is also evidence that host-country mentors improve expatriate effectiveness, perhaps because they accelerate the learning process (Carraher, Sullivan, & Crocitto, 2008). In more recent work, scholars examined *challenge stressors* in expatriate assignments (Firth, Chen, Kirkman, & Kim, 2014). In their longitudinal study of 118 expatriates in the energy industry, Firth and colleagues conclude that challenge stressors, which were conceptualized as opportunities for achievement and growth, improved expatriates' ability to adjust to their assignment over time. Taken together, this body of research on expatriate assignments suggests that workers often experience exposure to other cultures and intercultural interaction as learning opportunities and that these opportunities can enhance motivation and lead to better outcomes.

According to our interviewees, networking with talented engineers located in other countries was one of the main benefits of global virtual work, increasing opportunities to learn new technical skills. In addition, our interviewees emphasized being able to develop their knowledge of other cultures and understanding of the global business environment. Global virtual workers are likely to collaborate with people who have dissimilar educational, professional, and cultural backgrounds, thus increasing their opportunities to be exposed to different perspectives. Evidence indicates that culturally diverse collocated settings enrich learning opportunities by providing a wider pool of new experiences (Ely & Thomas, 2001). Evidence also suggests that this extends to global virtual work. Sole and Edmondson (2002), for example, report that exposure to diversity in global virtual teams stimulated interaction with people from different backgrounds, which lead to more learning opportunities.

Based on the forgoing evidence, we posit that, compared with local work, global virtual work may elicit higher levels of exposure to different people, perspectives, and information and, therefore, create more learning opportunities. We suggest that global virtual work, more so than local work, will be associated with more learning opportunities, above and beyond the learning opportunities afforded by increased job complexity.

Hypothesis 2: Global virtual work, as compared with local work, will be more positively related to learning opportunities.

Off-job Recovery

Thus far, we have proposed that the demands of global virtual work have the potential to increase perceived job complexity and, independently,

learning opportunities for knowledge workers. Our qualitative data also suggest that off-job recovery is crucial for sustaining global workers' energy and that recovery may affect perceptions of the work. In accordance with work design theories (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Karasek, 1979), we propose that workers need to have enough resources, especially mental and physical energy, to be able to see demands as motivating and not as obstacles. The unique requirements of global virtual work may, however, deplete workers' energy and make recovery difficult. Working across time zones, for example, can tax employees' cognitive resources by requiring them to work at unconventional hours as they coordinate with coworkers located on other continents (Carmel & Espinosa, 2012), ultimately overextending workers and threatening their learning capacity. Paradoxically, when global team members prioritize late night meetings and compromise their sleep, sleep deprivation can impair their neurocognitive performance and memory consolidation, which are necessary for learning (Born & Wilhelm, 2012). Our interviews suggest that, eventually, depletion may lead to fatigue and can even affect workers' perceptions of work, leading them to have more negative than positive appraisals. Appraisal theories explain that, when an individual has insufficient resources to deal with the demands of the work, she/he sees them as stressors and obstacles and not as opportunities to learn and grow (Lazarus & Folkman, 1984).

Individual energy is replenished during a recovery process when no further demands are imposed (Meijman & Mulder, 1998). If the recovery is insufficient, the individual starts the next working day in a suboptimal state. Off-job recovery experiences, therefore, enable employees to stay energetic and engaged in work even when facing high job demands (Sonnentag, Binnewies, & Mojza, 2010; Trougakos, Beal, Green, &Weiss, 2008). Our qualitative data indicate that replenishing energy between workdays may foster positive appraisal of global virtual work by increasing workers' resources to face challenging work situations.

Taken together, the literature and our qualitative data indicate that off-job recovery may affect whether the work design characteristics of global virtual work will be perceived more or less favorably. More specifically, we suggest that off-job recovery will influence knowledge workers' perceptions so that those who experience more recovery between workdays will perceive global virtual work as more enriched, motivating, and infused with learning opportunities than those whose recovery is insufficient.

Hypothesis 3: Off-job recovery moderates the positive effects of global virtual work on perceived (a) job complexity and (b) learning opportunities such that there is a stronger positive relationship between global virtual work and job complexity and learning opportunities when off-job recovery is higher.

Global Virtual Work and Outcomes

Research on work design has consistently established a relationship between work design characteristics and outcomes (Hackman & Oldham, 1980; Parker, Johnson, Collins, & Nguyen, 2013). Outcomes of work design tend to group into behavioral (e.g., performance, turnover), attitudinal (e.g., job satisfaction), and well-being (e.g., stress, burnout) categories. In their meta-analysis, for example, Humphrey et al. (2007) reported that all dimensions of job complexity were related to at least one behavioral, attitudinal, and well-being outcome, including performance, job satisfaction, and job involvement. For global virtual work, we predict more innovative performance, job satisfaction, and employee engagement. Innovative performance has yet to receive much attention in studies of global virtual work (Gilson et al., 2015) even though geographically dispersed teams are often lauded as being a vehicle for innovation because they leverage diversity (Sole & Edmondson, 2002). One of the few studies to examine innovation in global virtual teams reports that, although diversity in collaborators' backgrounds, experiences, mental models, and approaches to problem solving have been shown to increase creativity in collocated multicultural collaborations, the opposite appears to be true for global teams (Gibson & Gibbs, 2006). Gibson and Gibbs' (2006) analysis of 14 teams suggests that national diversity, geographic dispersion, and electronic dependence have negative effects on innovative performance because distance and national differences in norms, expectations, and behavior impede information sharing and complicate coordination. Martins and Shalley (2011) also found that national diversity can have strong negative effects on creativity when team members' technical experiences are also different.

Despite this initial evidence, we predict that, when global virtual work provides substantial job complexity and learning opportunities for knowledge workers, it will also improve innovative performance. Having challenging work stimulates creativity

(Amabile, Conti, Coon, Lazenby, & Herron, 1996), and job complexity has been associated with workers' creativity in collocated work. Oldham and Cummings (1996), for example, showed that workers produce more patent disclosures, make more contributions to organizational suggestion programs, and get higher supervisory ratings for creativity when working in complex, challenging jobs. Team learning research also has focused attention on different sources of knowledge leveraged for innovative performance. Wong (2004), for example, measured "local learning" (learning from interactions within a group) and "distal learning" (learning by seeking help or information from external parties) in 73 teams. Her results show that distal learning predicts team innovativeness, which may suggest that global virtual teams, by virtue of their wider span of access and opportunities to learn, may experience more innovation. Research on people who have lived abroad, including expatriates, has also linked the learning that results from immersive cross-cultural experiences to increased creativity (Fee & Gray, 2012; Maddux, Adam, & Galinsky, 2010), suggesting that global virtual work may enhance innovation by increasing learning opportunities. We therefore expect that global virtual work will increase knowledge workers' innovative performance when they experience higher job complexity and learning opportunities.

We also examine the effects of global virtual work on employee attitudes. Research on employee attitudes in global virtual work is scarce, but the work that exists suggests that virtual workers can attain high levels of satisfaction as long as their work and interactions are effectively managed (Purvanova & Bono, 2009). Over 30 years of research on work design in collocated work has established that job complexity increases job satisfaction (e.g., Hackman & Oldham, 1976; Humphrey et al., 2007), defined as the "pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences" (Locke, 1976: 1300). In their early study on work motivation in collocated teams, Herzberg, Mausner, and Snyderman (1959) also identified the possibility of growth, achievement, and recognition as objective elements of the situations that trigged job satisfaction. To date, however, we have no clear evidence about how working globally or the design of global virtual work affects job satisfaction (Caya et al., 2013). Gilson et al.'s (2015) review on virtual team studies suggests that team members can attain high levels of satisfaction as long as the intervening variables, such as technological capabilities (e.g., van der Kleij, Schraagen, Werkhoven, & De Dreu, 2009) and learning behaviors (e.g., Ortega, Sanchez-Manzanares, Gil, & Rico, 2010), are adequately managed. Based on this previous work and insights from our qualitative data, we hypothesize that job complexity and learning opportunities will be associated with higher job satisfaction and will mediate the relationship between global virtual work and job satisfaction.

Finally, we examine knowledge workers' engagement – the degree to which workers are focused on and present in their work (Kahn, 1990; Rothbard, 2001). Our qualitative data reveal that job complexity and learning opportunities were associated with engineers expressing excitement and enthusiasm about their work. Work design research conducted in collocated work also associates challenging job demands with work engagement, especially when the worker has adequate resources to successfully manage the challenges (Crawford et al., 2010). Work that has the potential to promote mastery, personal growth or future gains is also known to foster work engagement (Demerouti et al., 2001). In line with this reasoning, we suggest that if global virtual work is experienced as high in job complexity and learning opportunities, knowledge workers will be more engaged.

Hypothesis 4: Job complexity (a) and learning opportunities (b) will mediate the positive relationship between global virtual work and innovative performance.

Hypothesis 5: Job complexity (a) and learning opportunities (b) will mediate the positive relationship between global virtual work and job satisfaction.

Hypothesis 6: Job complexity (a) and learning opportunities (b) will mediate the positive relationship between global virtual work and work engagement.

STUDY 2: SURVEY OF GLOBAL WORKERS

In our second study, we tested our hypotheses in a survey-based study of 515 members of a labor union for experts and managers.

Method

In study 2, we distributed an online survey to a sample of knowledge workers (May 2014) that included members of a Finnish national labor union confederation of affiliates for people working in expert and managerial positions (Akava). A link to the electronic survey was sent to 8000 Akava-

members via email by their unions; 27.4% of these email messages were opened, indicating that 2192 Akava-members received the survey invitation. As an incentive to participate, we offered to deliver individual feedback immediately to each respondent via an automated tool after answering the questionnaire. Of those who opened the emails, 813 completed the entire survey, resulting in a response rate of 37.1%. We excluded 289 of these respondents because they were domestically distributed rather than collocated or global, leaving us with a final sample of 515 respondents. The global virtual workers ($n = 345$) worked regularly with at least one coworker in another country, and the collocated local workers ($n = 170$) worked with only coworkers at the same site in Finland. Respondents represent a large variety of occupations (e.g., marketers, engineers, programmers, consultants, etc.), industries (e.g., professional services, public services, manufacturing, etc.), and types of organizations (MNCs, SMEs, public organizations, and non-profit organizations). The average age of respondents was 43 years ($SD = 10.16$). The majority were men (65%) and had a master's degree (64%). Twenty percent had a bachelor's, and 15.3% had a PhD. Global knowledge workers collaborated with coworkers located in other countries an average of 35.5% of their working time. Local workers collaborated only with local coworkers with whom they were collocated at the same site.

Measures

Global virtual work was measured by asking respondents to name the cities and countries where they worked and the cities and countries of their coworkers with whom they mainly collaborated. We then compared the country of the respondent with the countries of their coworkers and built a dichotomous variable capturing global virtual work (1 = if the respondent was in a different country than any of his/her coworkers) and local collocated work (0 = if all coworkers worked in the same location as the respondent). We dichotomized global vs local work to be aligned with our hypotheses and report these results for most analyses. We conducted additional analyses with a continuous variable (number of countries in which respondents had coworkers). The results were weaker but showed a similar pattern.

Perceived job complexity was assessed using the Finnish language version of Hackman and Oldham's (1975) Job Diagnostic Survey, JDS (Vartiainen, 1989), which includes five sub-scales for job complexity. *Autonomy* was measured with three items e.g., "The job permits me to decide on my own how the work is done"). *Feedback* was measured with four items (e.g., "Just doing the work required by the job provides many chances for me to figure out how well I am doing"). *Skill variety* was measured with two items (e.g., "The job requires me to use a variety of my skills and talents"), *task identity* with two items (e.g., "The job provides me chance to completely finish the piece of work I begin"), and *task significance* with two items (e.g., "The results of my work are likely to significantly affect the lives of other people"). The items were rated on a seven-point scale of 1 (very inaccurate) to 7 (very accurate).

Typically, these five core work design characteristics are combined into a single index referred to as a *motivating potential score* that reflects overall job complexity and its potential to influence the individual's feelings and behaviors (Fried & Ferris, 1987). We, however, followed Law and Wong's (1999) recommendation to use the sub-scales of job complexity as indicators of a latent variable in structural equation analysis. An exploratory factor analysis of the 13 JDS items resulted in three factors with eigenvalues greater than 1. The factors were (a) autonomy (3 items), (b) feedback (4 items), and (c) a six-item factor combining skill variety (2 items), task significance (2 items), and task identity (2 items). We conducted a confirmatory factor analysis of these 13 items by specifying the three-factor structure. Analysis showed an acceptable fit to our data ($\chi^2[62] = 151.72$, $p<0.001$, CFI = 0.96, IFI = 0.96, RMSEA = 0.06, SRMR = 0.05) and a significantly better fit than the theoretically plausible five-factor model separating the sub-scales of job complexity into five factors ($\chi^2[61] = 297.68$, $p<0.001$, CFI = 0.88, IFI = 0.89, RMSEA = 0.09, SRMR = 0.08; $\Delta\chi^2[1] = 145.96$, $p<0.001$) and one-factor model combining all the sub-scales ($\chi^2[65] = 385.54$, $p<0.001$, CFI = 0.85, IFI = 0.85, RMSEA = 0.10, SRMR = 0.08; $\Delta\chi^2[3] = 233.82$, $p<0.001$). Using the three-factor structure, we computed averages across the items of skill variety, task significance, and task identity ($\alpha = 0.82$), an average across three items of autonomy ($\alpha = 0.70$) and across four items of feedback ($\alpha = 0.71$) to form three indicators for the latent variable. Intercorrelations among the three scales ranged from 0.36 to 0.56.[2] Because skill variety, task significance, and autonomy were more strongly present in our qualitative data than task identity and feedback, we also created a measure that included only these three items. Although the pattern of results was the same, the model fit was significantly worse, so we present the larger model in the results.

Learning opportunities was measured using a four-item scale: "To what extent does your work provide you with (1) opportunities for personal growth and development, (2) intellectual challenges, (3) opportunities to learn new things, and (4) chances of getting interesting work tasks in the future?" All items were scored on a five-point scale, ranging from 1 = not at all to 5 = very much. Cronbach's α was 0.88.

Outcome variables (innovative performance and job satisfaction) were measured on a seven-point scale (1 = totally disagree to 7 = totally agree). *Innovative performance* was measured with three questions ($\alpha = 0.87$) from Janssen (2000), including "I have created new ideas for difficult issues," "I have searched out new working methods, techniques, or instruments," and "I have generated original solutions for problems." Two native Finnish speakers translated the questions from the original English version to Finnish independently. The translations of each question were then assessed and discussed in a small group of researchers fluent in both languages until agreement of the questions' linguistic equivalence was reached. *Work engagement* was assessed using the Finnish language version of Utrecht Work Engagement Scale with nine items (Hakanen, 2009). The scale has three dimensions, comprising vigor (three items; e.g., "At my job, I feel strong and vigorous", $\alpha = 0.91$), dedication (three items; e.g., "My job inspires me", $\alpha = 0.91$), and absorption (three items; e.g., "I am immersed in my work", $\alpha = 0.84$). Responses were given on a seven-point scale from 1 (never) to 7 (every day). *Job satisfaction* was measured with three questions ($\alpha = 0.87$) from the Finnish version of JDS (e.g., "Generally speaking, I am very satisfied with this job").

Off-job recovery experiences, composed of psychological detachment and relaxation, was measured using the Finnish language version of Recovery Experience Questionnaire (Kinnunen, Feldt, Siltaloppi, & Sonnentag, 2011). Participants were asked to respond to the items with respect to their free time after work. The relaxation scale included three items (e.g., "I use the time to relax", $\alpha = 0.79$), and the psychological detachment scale included three items (e.g., "I distance myself from my work", $\alpha = 0.81$). The items were rated on a five-point scale ranging from 1 (totally agree) to 5 (totally disagree).

Control variables were included in the model to account for potential differences that co-varied with the type of worker (e.g., global virtual vs local workers). Our sample comparison (see Table 2) indicates that global workers, as compared with local workers, were more likely to be male, technical, work in an organization that is multinational and large, and have longer tenure and more experience working virtually. To account for these differences, we included these controls in the final model. Although expertise (level of education) was not significantly different between global and local workers, we included expertise in the model because learning theories suggest that task performance becomes more automatic as skills are developed (e.g., Ackerman, 1989), which may make the task seem less complex and less rich in learning opportunities over time. Similarly, although age did not differ significantly between global and local workers, we controlled for age because physical and cognitive resources usually decrease as people get older (Kanfer & Ackerman, 2004), and, thus, age may affect performance. We also controlled for growth need strength (i.e., the degree to which an individual values opportunities for personal growth at work).

RESULTS

The means, standard deviations, and correlations of the study variables are presented in Table 3. The correlations show, first, that global virtual work is related to job complexity and learning opportunities and two of the hypothesized outcomes, innovative performance and work engagement, but not job satisfaction. Second, off-job recovery correlated with two of the three outcomes, including job satisfaction and work engagement, but not innovative performance. The proposed mediators correlated highly with each other ($r = 0.54$), as did the outcome variables. Despite high correlations, our confirmatory factor analyses (CFAs) show that both the mediators and all outcomes are separate constructs.

Measurement Model

Before testing our hypotheses, we conducted a series of CFAs with AMOS 22.0 software and the maximum likelihood method of estimation to confirm the distinctiveness of the study constructs. Model fit was evaluated using absolute (χ^2 goodness-of-fit statistic, Root Mean Square Error of Approximation [RMSEA], and Standardized Root Mean Residual [SRMR]) and relative indices (Incremental Fit Index [IFI] and Comparative Fit Index [CFI]).[3]

The measurement model consisted of nine observed variables (global virtual work and eight control variables) and seven latent study constructs (job complexity, learning opportunities, off-job recovery, innovative performance, job satisfaction, work engagement, and growth need strength). This 16-factor model fit the data well ($\chi^2[268] = 628.05$, $p<0.001$, CFI = 0.95, IFI = 0.95, RMSEA = 0.05, SRMR = 0.04)

Table 2 Demographic data of the survey respondents in study 2, comparing global to local workers

Variables	Global workers ($N=356$)	Local workers ($N=159$)	Univariate F
Gender			7.25**
Female	110	68	
Male	244	89	
Age			1.23
younger than 30	21	18	
30–45	177	71	
46–60	132	58	
Older than 60	24	9	
Level of education			2.67
Bachelor's degree	64	41	
Master's degree	236	95	
PhD	56	23	
Type of work			4.78*
Non-technical	197	68	
Technical	156	86	
Type of organization			28.83***
Finnish organization	156	109	
Multinational organization	190	46	
Size of organization			5.00*
Small- and medium size (<250 employees)	81	51	
Large (> 250 employees)	265	104	
Tenure in the organization			13.75***
0–2 years	79	48	
3–5 years	59	38	
5–10 years	84	34	
over 11 years	130	156	
Virtual work experience			61.00***
years	12	5.7	

Note: ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

and significantly better than theoretically plausible alternative models, that is, the 15-factor model combining the mediators (job complexity and learning opportunities) into a single construct ($\chi^2[283]=865.56$, $p<0.001$, CFI = 0.92, IFI = 0.93, RMSEA = 0.06, SRMR = 0.05; $\Delta\chi^2[15]=237.51$, $p<0.001$), the 13-factor model combining the outcomes into a single outcome measure ($\chi^2[310]=1924.89$, $p<0.001$, CFI = 0.79, IFI = 0.79, RMSEA = 0.10, SRMR = 0.08; $\Delta\chi^2[42]=1296.84$, $p<0.001$), and the single-factor model ($\chi^2[379]=4165.69$, $p<0.001$, CFI = 0.50, IFI = 0.50, RMSEA = 0.14, SRMR = 0.12; $\Delta\chi^2[111]=3537.64$, $p<0.001$).

Our survey-based correlational study has the potential to raise common method variance (CMV) concerns. To proactively address these concerns, we followed recommendations from Podsakoff, MacKenzie, Lee, and Podsakoff (2003) to incorporate procedural remedies in our study design (e.g., randomizing the order of scale items, using different response scales and separating predictor and criterion variables). We also used previously validated measurement items whenever possible. Further, in our analysis, we used two tests, Harman's one factor test and common latent factor test (Podsakoff et al., 2003), to determine the extent of CMV in the study data. First, we conducted Harman's one-factor test by entering all items from all of the constructs in the study into an EFA. If CMV exists in the data, only one general factor emerges from the factor analysis or one factor accounts for over 50% of the variance. Instead, seven factors with eigenvalues greater than one emerged from our unrotated principal component factor analysis and the first factor accounted for only 24.83% of the total variance. Next, we introduced a common latent factor in the 16-factor model and measured CMV by subtracting standardized regression weights without the common latent factor from standardized regression

Table 3 Means, standard deviations, and intercorrelations of all variables of interest ($N = 515$)

Variable	M	SD	1	2	3	4	5	6	7
1. Global virtual work[a]	0.69	0.46							
2. Job complexity	4.98	0.90	0.13**						
3. Learning opportunities	3.48	0.94	0.21**	0.54**					
4. Off-job recovery	4.88	1.05	–0.01	0.15**	0.05				
5. Innovative performance	4.52	1.23	0.17**	0.37**	0.35**	–0.06			
6. Job satisfaction	4.71	1.45	0.07	0.59**	0.66**	0.28**	0.27**		
7. Work engagement	5.16	1.20	0.12**	0.59**	0.63**	0.14**	0.40**	0.69**	
8. Gender[b]	0.65	0.48	0.12**	0.06	–0.04	0.04	0.19**	0.02	–0.02
9. Age	43.37	10.16	0.05	0.14**	–0.12*	–0.09*	0.08	0.01	0.03
10. Level of education[c]	1.95	0.61	0.07	0.06	0.13*	–0.06	0.15**	0.02	0.03
11. Type of work[d]	0.45	0.50	–0.10**	–0.07	–0.01	0.11*	–0.07	0.02	–0.12**
12. Type of organization[e]	0.47	0.50	0.23	0.03	–0.05	0.12**	–0.03	–0.03	–0.05
13. Size of organization[f]	0.74	0.44	0.10*	–0.02	0.05	0.08	–0.03	0.06	0.00
14. Tenure in the organization	9.40	8.96	0.16**	0.17**	–0.05	–0.03	0.19**	0.04	0.01
15. Virtual work experience	10.00	8.78	0.33**	0.19**	0.06	0.21**	–0.11	0.05	0.12**

Variable	8	9	10	11	12	13	14
1. Global virtual work[a]							
2. Job complexity							
3. Learning opportunities							
4. Off-job recovery							
5. Innovative performance							
6. Job satisfaction							
7. Work engagement							
8. Gender[b]							
9. Age	0.20**						
10. Level of education[c]	–0.07	0.01					
11. Type of work[d]	0.14**	–0.14**	0.01				
12. Type of organization[e]	0.10**	–0.04	–0.17**	0.08			
13. Size of organization[f]	0.19**	–0.03	–0.06	0.15**	0.41**		
14. Tenure in the organization	0.59**	–0.57**	–0.11*	–0.04	0.07	0.20**	
15. Virtual work experience	0.21**	–0.62**	–0.03	–0.16**	0.09	0.04	0.46**

[a]0 = local work, 1 = global virtual work.
[b]0 = female, 1 = male.
[c]1 = bachelor's, 2 = master's, 3 = PhD.
[d]0 = non-technical, 1 = technical.
[e]0 = Finnish national, 1 = multinational.
[f]0 = small- and medium size (SME), 1 = Large (> 250 employees).
Note: ** $p<0.01$; * $p<0.05$.

weights with the common latent factor. The results did not exceed 0.2, which is a threshold value for common method bias. Thus we conclude that CMV is unlikely to be causing the relationships among the study variables.

Model Testing

We used structural equation modeling (SEM), as recommended by Preacher, Rucker, and Hayes (2007), to test the proposed moderated mediation model. The interaction term of global virtual work and recovery experiences was included in the model to test the moderation hypothesis 3. The structural model we tested (see Figure 1) fit the data well: $\chi^2[283] = 644.59$, $p<0.001$; CFI = 0.95, IFI = 0.95, RMSEA = 0.05, SRMR = 0.04. To test our moderated mediation hypotheses (H4a–b, H5a–b and H6a–b), we applied the procedure proposed by Preacher et al. (2007) of testing the indirect effects of global virtual work on outcome variables at three levels of off-job recovery (–1 *SD*, mean, and +1 *SD*). To test the mediating effects of job complexity and learning opportunities, we tested the SEM (Figure 1) with one mediator at a time, as recommended. We used percentile bootstrapping

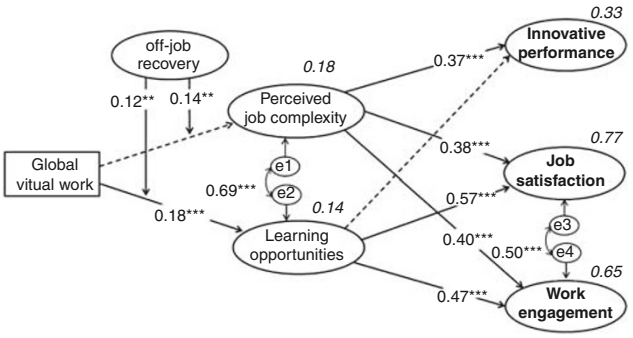

Figure 1 Structural equation model.
Note: Maximum likelihood estimates for the hypothesized model, $N = 515$, and Squared multiple correlations (R^2) for endogenous variables are reported in italics. Solid lines represent significant paths; dotted lines represent non-significant paths. ***$p<0.001$, **$p<0.01$, *$p<0.05$.

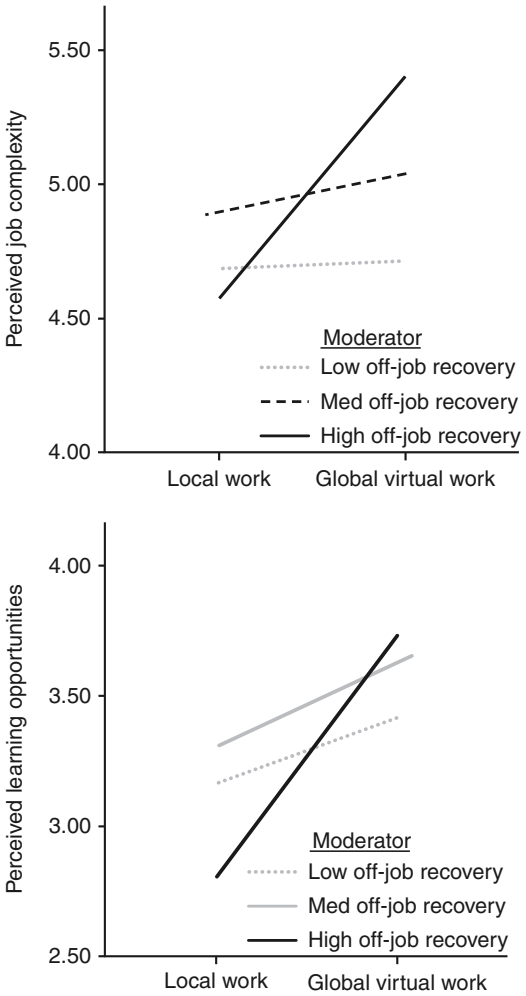

Figure 2 Interaction between global vs local work and off-job recovery experiences predicting (2a) perceived job complexity and (2b) learning opportunities (scale from 1 to 7).
Note: Solid lines represent significant paths; dotted lines represent non-significant paths.

with 2000 resamples to test whether the indirect effects differed significantly from zero. The benefit of bootstrapping is that it avoids power problems derived from asymmetric and other non-normal sampling distributions of an indirect effect (MacKinnon, Lockwood, & Williams, 2004).

Contrary to our first hypothesis (H1), global virtual work was not significantly related to job complexity ($\beta = 0.07$, $p = 0.20$). Global virtual work was, however, significantly associated with increased learning opportunities ($\beta = 0.18$, $p<0.001$) as predicted (H2). As hypothesized (H3a and H3b), off-job recovery also moderated the relationship between global virtual work and job complexity ($\beta = 0.14$, $p<0.01$) and learning outcomes ($\beta = 0.12$, $p<0.01$). To examine the specific form of this interaction, we conducted simple slope analyses (Aiken & West, 1991). The plot shown in Figure 2a illustrates that, when recovery experiences were high (+1 *SD*), working globally was associated with increased perceptions of job complexity ($B = 0.39$, $p < 0.001$),[4] but when recovery experiences were at medium (mean) or low levels (–1 *SD*), working globally had no significant effect on job complexity ($B = 0.15$, n.s., and $B = –0.09$, n.s., respectively), suggesting that global workers need substantial off-job recovery to perceive their work as positively complex. As shown in Figure 2b, global workers were also more likely to experience learning opportunities when recovery was high vs low. A simple slope test further shows that global virtual work significantly predicted more learning opportunities at a high level of recovery (+1 *SD*) ($B = 0.60$, $p<0.001$) and at a medium level of recovery ($B = 0.38$, $p<0.001$) whereas this relationship was not significant at a low level of recovery (–1 *SD*) ($\beta = 0.16$, n.s.). These results indicate that off-job recovery may be essential for global workers to perceive job complexity and learning opportunities.[5]

Our hypotheses regarding the mediating role of learning opportunities on innovation, engagement, and satisfaction in global virtual work (H4a–b, H5a–b and H6a–b) were all partially supported. We did not find main effects between global work and the outcome measures, but recent research has argued that this condition is not required for mediation (e.g., Preacher & Hayes, 2004). Instead, we evaluated the indirect effects to assess the intervening role of job complexity and learning. As expected (H4a–b), global virtual work was related to innovativeness through job complexity (bootstrapping estimate = 0.62, 95% CI [0.27, 1.04], $p = 0.002$) and learning opportunities (bootstrapping estimate =

Table 4 Indirect effects of global virtual work on outcome variables at a high, medium, and low level of off-job recovery

	Bootstrapping		PC 95% CI	
	Estimate	SE	Lower	Upper
Indirect effects $x \rightarrow m \rightarrow y$				
(H4a) Global virtual work → job complexity → innovative performance				
at a high level of off-job recovery (+1 SD)	0.62**	0.20	0.27	1.04
at a medium level of off-job recovery (mean)	0.09	0.06	0.03	0.23
at a low level of off-job recovery (–1 SD)	0.02	0.22	–0.41	0.50
(H4b) Global virtual work → learning opportunities → innovative performance				
at a high level of off-job recovery (+1 SD)	0.56**	0.20	0.23	0.99
at a medium level of off-job recovery (mean)	0.12**	0.05	0.03	0.23
at a low level of off-job recovery (–1 SD)	0.03	0.10	–0.07	0.31
(H5a) Global virtual work → job complexity → job satisfaction				
at a high level of off-job recovery (+1 SD)	1.12**	0.36	0.56	2.02
at a medium level of off-job recovery (mean)	0.25	0.15	–0.05	0.55
at a low level of off-job recovery (–1 SD)	0.03	0.45	–0.77	0.94
(H5b) Global virtual work → learning opportunities → job satisfaction				
at a high level of off-job recovery (+1 SD)	1.12**	0.33	0.54	1.79
at a medium level of off-job recovery (mean)	0.26**	0.15	0.12	0.70
at a low level of off-job recovery (–1 SD)	0.39	0.35	–0.26	1.12
(H6a) Global virtual work → job complexity → work engagement				
at a high level of off-job recovery (+1 SD)	1.02**	0.31	0.48	1.72
at a medium level of off-job recovery (mean)	0.16	0.09	–0.03	0.35
at a low level of off-job recovery (–1 SD)	0.03	0.34	–0.65	0.69
(H6b) Global virtual work → learning opportunities → work engagement				
at a high level of off-job recovery (+1 SD)	0.94**	0.27	0.43	1.48
at a medium level of off-job recovery (mean)	0.26**	0.09	0.08	0.45
at a low level of off-job recovery (–1 SD)	0.22	0.22	–0.15	0.71

Note: SD = standard deviation, PC = percentile; CI = confidence interval. Entries represent unstandardized coefficients. $^{**}p < 0.01$, $^{*}p < 0.05$, $N = 515$.

0.56, 95% CI [0.23, 0.99], $p = 0.002$), but only at a high level of off-job recovery (+1 *SD*). At a low level of recovery (–1 *SD*), however, the relationship between global virtual work and innovation faded away (see Table 4). In support of H5a and H5b, global virtual work was significantly indirectly associated with job satisfaction through job complexity (bootstrapping estimate = 1.12, 95% CI [0.54, 2.02], $p = 0.001$) and learning opportunities (bootstrapping estimate = 1.12, 95% CI [0.54, 1.79], $p = 0.001$) at a high level of off-job recovery (+1 *SD*). Again, at a low level of recovery (–1 *SD*), this indirect effect was no longer significant. Finally, consistent with H6a and H6b, global virtual work was significantly indirectly related to work engagement through job complexity (bootstrapping estimate = 1.02, 95% CI [0.48, 1.72], $p = 0.001$) and learning opportunities (bootstrapping estimate = 0.94, 95% CI [0.43, 1.48], $p = 0.001$) at a high level of off-job recovery (+1 *SD*) but not at a low level of recovery (–1 *SD*). We found no significant direct path between global virtual work and any of our outcome variables, indicating that perceived job complexity and learning opportunities are mechanisms that transmit the positive effects of global virtual work on desirable work outcomes at a high level of off-job recovery.

DISCUSSION

After decades of research focusing on the difficulties and frustrations of global virtual work, our study highlights a potential silver lining. That is, global virtual work can be more motivating and more satisfying than working locally, despite or perhaps because of the challenges inherent in it. Our results

suggest that global virtual work is associated with more perceived job complexity and more learning opportunities. We further find that, despite the struggle of taking time to recover between work days when working globally, doing so may be crucial to achieving these benefits. In terms of outcomes, we show that perceived job complexity and learning opportunities are associated with more innovative performance, job satisfaction, and work engagement, especially when recovery is high. We contribute to a deeper understanding of how crossing distance, national boundaries, cultures, and languages affect global virtual workers and, in particular, the benefits that are possible in global virtual work for employees' growth and satisfaction. We also extend work design theory, pointing to how we can leverage distance and diversity to unleash the potential of global virtual work for workers and, in turn, for the global organizations that employ them. We further identify *learning opportunities* as a new work design characteristic that sits alongside, but is distinct from, job complexity and has as strong or stronger effects on the outcomes we examined. Finally, we import the concept of off-job recovery as a variable that moderates the extent to which workers experience the challenges they face as being imbued with opportunities or not. Taken together, our results suggest that job complexity and learning opportunities are important work design characteristics in global virtual work that contribute to a variety of positive outcomes but are realized most strongly when workers take time to relax and recover from the demands of day-to-day work.

Despite a few exceptions (e.g., Gibson et al., 2011; O'Leary & Mortensen, 2010), much of the existing research on global virtual work has tended to focus on topics such as team dynamics, technology, and leadership (see Gilson et al., 2015), but neglected issues related to the design of global virtual work. Our research suggests that there are particular aspects of global virtual work that affect work design characteristics in important ways. Contrary to the grim perspective of most research on global virtual work, global workers reported more task significance ($M = 5.38$ vs 5.00, $F = 10.07$, $p<0.01$), autonomy ($M = 5.44$ vs 5.19, $F = 4.90$, $p<0.05$), skill variety ($M = 6.12$ vs 5.19, $F = 25.05$, $p<0.001$), and learning opportunities ($M = 3.61$ vs 3.18, $F = 24.26$, $p<0.001$) than local workers in study 2. This suggests that global virtual work, rather than being unappealing and burdensome, has design characteristics that can lead to more positive employee experiences than does local work. Finally, global as compared with local workers reported more innovative performance ($M = 4.64$ vs 4.26, $F = 10.82$, $p<0.001$), more work engagement ($M = 5.25$ vs 4.97, $F = 5.89$, $p<0.05$), and less burnout ($M = 3.27$ vs 3.48, $F = 4.04$, $p<0.05$) (as well as more job satisfaction, but not significantly so, $M = 4.76$ vs 4.59, $F = 1.39$, n.s.). In fact, global workers were either equal to or exceeded local workers on every outcome measure we tested, including well-being (i.e., less burnout), again challenging the idea that global virtual work is a necessary evil.

One of the findings that emerged from our preliminary qualitative study (study 1) and was supported in the main study (study 2) is that learning opportunities are central to work design in global virtual work. The learning opportunities variable, in fact, was more strongly related to global virtual work than was job complexity. Although there was a strong connection, as might be expected, between job complexity and learning, the effect of learning was above and beyond that of job complexity, thus strongly suggesting a new work design characteristic for modern global work. In our qualitative study, engineers spoke extensively about the learning opportunities available to them in global projects. They extolled the value of learning from talented engineers around the globe and developing their cross-cultural skills, both of which overshadowed the extra burden of working globally. Our quantitative results confirm that global workers perceived their work as having more learning opportunities than did local workers. Although the focus of our study is on global virtual workers, our data also suggest that local workers benefitted from learning opportunities. In an SEM analysis that included only local workers, we found that learning opportunities were highly correlated with innovative performance ($\beta = 0.55$, $p<0.01$), job satisfaction ($\beta = 0.67$, $p<0.001$), and work engagement ($\beta = 0.47$, $p<0.01$), indicating that learning opportunities may reflect an important design characteristic for modern-day work, more broadly.

Another emergent finding from our qualitative study was the paradox of global virtual work being associated with *less* off-job recovery, whereas *more* off-job recovery appeared to be crucial for workers to appraise the challenges of global virtual work positively. Our results from study 2 indicate that off-job recovery may indeed moderate the effects of global virtual work on perceived job complexity and learning opportunities. More specifically, the motivating potential of job complexity was only perceived when recovery was high (e.g., over 5.93 on a seven-point scale) but not when it was at medium

or low levels. Perceived learning opportunities were less sensitive to off-job recovery than job complexity. Both high and medium levels of recovery were associated with more learning opportunities. Our interviewees told us about feeling compelled to extend their work hours late into the evening and start again in the wee hours of the morning because their global collaborators were depending on them. Our quantitative data confirmed this. Global as compared with local workers reported significantly more work outside of normal hours ($M = 6.39$ vs 4.17 h/week, $F = 12.44$, $p<0.001$) and longer work days ($M = 44.5$ vs 40 h/week, $F = 18.20$, $p<0.001$). Surprisingly, however, local workers did not report significantly more off-job recovery than did global workers ($M = 4.90$ vs 4.87, $F = 0.06$, n.s.). This appears to be contradictory. We speculate that perhaps global virtual workers found coping mechanisms that enable them to recover even when working long hours. Future research is needed to investigate the means and mechanisms that global workers use to ensure a sufficient amount of off-job recovery during their limited and potentially fragmented leisure time. Prior research has established that off-job recovery moderates the relationship between psychosocial work design characteristics and harmful well-being effects, such as burnout (e.g., Etzion, Eden, & Lapidot, 1998; Siltaloppi, Kinnunen, & Feldt, 2009). As far as we know, ours is the first study to consider the recovery experience as a contributor to positive work perceptions and perceptions of work design characteristics.

We extend the pioneering work of Gibson et al. (2011), who examined specific elements of global virtual work (e.g., electronic dependence and distance). They found that, when electronic dependence was high and copresence was low (both features of global work), task significance was more strongly related to meaningfulness. Our findings add to their work by suggesting that global virtual work has the potential to offer learning opportunities and that off-job recovery plays a crucial role in perceptions of work characteristics. Our incorporation of outcome measures allows us to establish the relationship between global virtual work and innovative performance, job satisfaction, and work engagement. As a result, our research moves toward a more complete work design model for global workers.

Some have speculated that the younger generation might have fewer difficulties with global virtual work because they receive more relevant training in university and have experience interacting with people at a distance from a young age, for example, on Facebook. Consistent with this, our results show that age moderates the relationships between global virtual work and learning opportunities ($\beta = 0.10$, $p<0.05$) and job complexity ($\beta = 0.08$, $p<0.05$) such that older knowledge workers report a stronger relationship between working globally and work design characteristics than do younger workers. Further (simple slope) analysis reveals that older (53 years and older) workers perceive most opportunities for learning ($B = 0.63$, $p<0.001$) and most job complexity ($B = 0.36$, $p<0.05$), and younger (33 years and less) workers perceive the least, but still a significant increase in, opportunities for learning ($B = 0.25$, $p<0.05$) but not job complexity ($B = 0.13$, n.s.). These findings indicate that younger knowledge workers may not perceive global virtual work as more complex than local work but that global virtual work still provides more learning opportunities than local work for all ages. Surprisingly, however, the older workers (53+ years old) are most engaged ($B = 0.63$, $p<0.001$) and least burned out ($B = -0.32$, $p<0.001$). One explanation is that older workers have objectively more job complexity and access to more learning opportunities. Unfortunately, without data on objective job complexity and learning opportunities we cannot examine this possible explanation and leave it to future research to examine this paradox more closely.

Although not the primary focus of our study, our research differs from previous work in that we examined and found that innovation was associated with more job complexity and learning in global virtual work. Despite the potential for diverse perspectives in global teams to generate more innovation, this potential is often unrealized (Gibson & Gibbs, 2006). We suggest that perhaps this can be attributed to a lack of off-job recovery, which could make it more difficult to resolve the differences identified as barriers to innovation (e.g., differences in norms, expectations, and behaviors). In fact, when off-job recovery is not included in our model, learning is not associated with innovative performance. Only when we examine the indirect effects of global virtual work on innovation at high and medium levels of off-job recovery do we see a positive effect of learning on innovation. In other words, global virtual workers only reported high innovation (mediated by learning) when they had sufficiently recovered. Further research is needed to fully understand the relationship between job design and innovation in global virtual teams, but our results suggest that off-job recovery may yield more innovation.

Another population working globally is expatriate workers who reside in another country for an extended period of time. Although our focus on global virtual work emphasized workers who coordinate across geographic distance and inhabit different physical and cultural contexts than their coworkers, some results may still be informative for expatriate workers. While abroad, expatriates often have more challenging roles and responsibilities than in their home office (Kim & Tung, 2013), have opportunities to learn about the language and culture of the host country (Osland, 2000; Tung, 1998), gain more organizational knowledge (Carraher et al., 2008), and improve intercultural, professional, and managerial skills (Stahl et al., 2002). As with research on expatriates (e.g., Firth et al., 2014), we found that learning in this global context was associated with higher satisfaction. We further found that learning was associated with higher levels of engagement and, perhaps most importantly, that learning was most present when workers had the opportunity for off-job recovery. It is not only global virtual workers who suffer from extended work hours and limited recovery time (e.g., Barley, Meyerson, & Grodal, 2011). We posit that, in addition to host country mentorship (e.g., Carraher et al., 2008), expatriates who have more opportunity to recover between workdays may learn more and therefore adjust better to overseas assignments. This, however, is left to future research.

As a practical contribution, our updated model of work design guides managers in designing work for global virtual workers. It suggests, in particular, that the effects of geographic and national diversity can benefit workers as well as outcomes, such as innovation, if global workers have opportunities to replenish their resources between workdays. It has been argued that, in societies with 24-h work expectations, lack of recovery could have profound effects on individuals' well-being (Zijlstra & Sonnentag, 2006) and, we argue, performance. We propose that organizations can get maximum benefit from global virtual work if they nurture a culture and set policies that support taking time away from work, encourage leisure activities, and discourage an *always on* expectation and mentality.

As with all studies, ours has limitations. First, our samples consisted mainly of Finnish workers. Due to employment laws in Finland, Finnish workers work shorter hours (i.e., 38 h per week) than in many other countries. Therefore our results, especially those related to burnout, may not generalize well to populations of workers who have longer workdays. It is interesting to note, however, that this makes our test somewhat conservative because off-job recovery is likely to be, in general, higher in Finland than in countries (such as the US) where employment law is not as favorable to workers. Given that off-job recovery needed to be high for workers to experience the motivational potential of job complexity, we predict that global virtual work might struggle to achieve this standard in places where workers typically work 60–70 h weeks, and, as a result, the benefits of global virtual work may not materialize. In fact, this is one possible explanation for the rather pessimistic results of existing studies, many of which are dominated by US-based samples. The Finnish sample may also be biased due to workers' experience in distributed virtual work ($M = 10$ years). Distributed work arrangements and global collaborations are more common in Finland than in most European countries (Gareis, Lilischkis, & Mentrup, 2006) due to Finland's remoteness, relatively scarce natural resources, and small domestic market. Finland is also a technologically advanced and networked country. We anticipate even stronger effects of global virtual work on perceptions of complexity and learning opportunities among workers from countries whose populations are less experienced, although empirical data are required to conduct these comparisons.

As with many cross-national studies, language is also a limitation. In study 1, we interviewed Finnish workers in Finnish and interviewed those from other geographies, mostly non-native English speakers, in English. As pointed out by Welch and Piekkari (2006), the quality of interview data can be affected when non-native English speakers interview other non-native English speakers, including less depth in responses of the respondent, reduced ability to follow up by the interviewer, and less accurate transcriptions due to accents. Non-native language usage may also affect rapport and trust between the interviewer and interviewees (Zhang & Guttormsen, forthcoming). Further, low language proficiency may exacerbate a second-language speaker's need to avoid a loss of face (Harzing & Feely, 2008). Therefore in our interviews, the Finns were in a better position than others because communicating in their mother tongue allowed them to fully express themselves and establish good rapport with the Finnish-native interviewer who, furthermore, was able to interpret their statements with cultural understanding. To address language issues in advance, we conferred with Telex and Escel as recommended by Chidlow et al. (2014), and were assured that employees were proficient in English as a condition of their employment. We also

measured the interviewees' English language proficiency by asking self-evaluations of their own English skills in speaking, listening, and writing. On a scale ranging from 0 = no proficiency to 10 = native speakers' proficiency, the interviewees' English language proficiency was, on average, high 8.13 (SD = 0.83). We also used a transcriptionist skilled at deciphering accents. In study 2, we conducted the survey in Finnish to address issues of language fluency, but this raises an additional issue. As discussed recently by Chidlow et al. (2014), even though we used validated Finnish translations for most the study variables and carefully assessed the quality of the translations, equivalence of the questions in both languages cannot be guaranteed. Hence the issue of language equivalency remains a concern.

We also explicitly study knowledge workers, so our work is not expected to generalize to other global virtual workers such as call center employees or those in manufacturing settings where the structures and expectations of work are different. In study 1, the interviewees were all engineers, which also may have biased our initial predictions. An analysis of the study 2 data comparing technical with non-technical workers suggests significant differences, although the effects for non-technical employees, especially related to off-job recovery, were stronger rather than weaker than for technical employees. Previous work has established differences in the work demands and practices of technical as compared with administrative workers, including their modes of collaboration (e.g., Hinds & Kiesler, 1995), so it is plausible that work characteristics and the need for recovery may also vary. Future research explicitly comparing technical with non-technical workers will be important to examining these differences.

Another limitation to the studies we report is that we do not have the benefit of longitudinal data. As a result, we cannot make claims about causality. We employed a cross-sectional design and, although the use of SEM permitted a simultaneous test of the entire system of variables in the hypothesized model, any causal explanation of our results should be taken with caution. As a check on the robustness of our model, we tested models in which we reversed the direction of the effects (i.e., innovation increasing perceptions of job complexity rather than the reverse), but these models did not fit our data well. The direction of causality proposed by theory is, therefore, plausible, but longitudinal data are required to validate the causal direction. Finally, our survey (correlational) study is susceptible to CMV. Triangulation between our qualitative and quantitative studies alleviates some of the risk of drawing erroneous conclusions. Also, our independent variable global virtual work was constructed rather than asked directly of respondents and analysis of our data suggests that CMV should not be a major concern. Still, replicating the study with longitudinal data is advised.

Despite these limitations, this research serves to demonstrate that global virtual work, contrary to the dominant view, may offer significant benefits to workers above and beyond working locally. Further, we identified design characteristics associated with global virtual work that can be heightened to further enhance the extent to which these workers thrive in their work. The essence of our proposed model is that global virtual work has the potential to increase job complexity and learning opportunities which, in turn, results in greater work engagement, more job satisfaction, and higher quality work outcomes, but only when workers take time to recover between work days.

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NOTES

[1]A final theme emerged related to the importance of interpersonal closeness in global work, but this theme was tangential to the focus of this study, and we were unable to measure it due to space limitations on the survey, so we exclude it from the discussion.

[2]To supplement this latent construct, we ran the analysis using the single item MPS: (variety+identity +significance)/3 × autonomy × feedback), unweighted additive index by simply summing the five work design characteristics, and weighted additive index = 2 (Variety) + 2(Autonomy) + Task Identity + Feedback. The results were essentially the same, but the latent construct produced the best model fit with the data. The results for MPS and other indexes are available from the authors on request.

[3]To assess how the hypothesized model fits our sample data, we utilized both absolute (χ^2, RMSEA and SRMR) and relative (IFI and CFI) fit indices. Non-significant χ^2 values indicate that the hypothesized model fits the data. χ^2 is sensitive to sample size and

assumes a perfect fit between the hypothesized model and the sample data. Thus in complex models χ^2 tends to be large and may not be as useful an indicator of model fit as the other absolute and relative indices. RMSEA values smaller than or equal to 0.08 are indicative of an acceptable fit. A good model should have an SRMR smaller than 0.05. For the relative fit-indices (IFI and CFI), as a rule of thumb, values of 0.95 or higher are considered as indicating a good fit.

[4]To conduct simple slope analyses, we used Process macro for SPSS (http://www.processmacro.org/), which reports the conditional unstandardized effects (not standardized effects) of IV on DV at high (+1 *SD*), medium (mean), and low (–1 *SD*) level values of the moderator. Therefore only unstandardized effects are reported for the simple slope analyses.

[5]To test if off-job recovery experiences also moderate elsewhere in the model, we performed additional regressions to test if the moderation is significant in the relationship between (a) job complexity and the controlled variables, (b) learning opportunities and the controlled variables, (c) global work and the outcomes, and (d) the mediators and the outcomes. The results of the regressions show that moderation is only present in the relationship between global work and job complexity and learning opportunities.

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