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How Effective Is Telecommuting? Assessing the Status of Our Scientific Findings

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Summary

Telecommuting has become an increasingly popular work mode that has generated significant interest from scholars and practitioners alike. With recent advances in technology that enable mobile connections at ever-affordable rates, working away from the office as a telecommuter has become increasingly available to many workers around the world. Since the term *telecommuting* was first coined in the 1970s, scholars and practitioners have debated the merits of working away from the office, as it represents a fundamental shift in how organizations have historically done business. Complicating efforts to truly understand the implications of telecommuting have been the widely varying definitions and conceptualizations of telecommuting and the diverse fields in which research has taken place.

Our objective in this article is to review existing research on telecommuting in an effort to better understand what we as a scientific community know about telecommuting and its implications. In so doing, we aim to bring to the surface some of the intricacies associated with telecommuting research so that we may shed insights into the debate regarding telecommuting's benefits and drawbacks. We attempt to sift through the divergent and at times conflicting literature to develop an overall sense of the status of our scientific findings, in an effort to identify not only what we know and what we think we know about telecommuting, but also what we must yet learn to fully understand this increasingly important work mode.

After a brief review of the history of telecommuting and its prevalence, we begin by discussing the definitional challenges inherent within existing literature and offer a comprehensive definition of telecommuting rooted in existing research. Our review starts by highlighting the need to interpret existing findings with an understanding of how the extent of telecommuting practiced by participants in a study is likely to alter conclusions that may be drawn. We then review telecommuting's implications for employees' work-family issues, attitudes, and work outcomes, including job satisfaction, organizational commitment and identification, stress, performance, wages, withdrawal behaviors, and firm-level metrics. Our article continues by discussing research findings concerning salient contextual issues that might influence or alter the impact of telecommuting, including the nature of the work performed while telecommuting, interpersonal processes such as knowledge sharing and innovation, and additional considerations that include motives for telecommuting such as family responsibilities. We also cover organizational culture and support that may shape the telecommuting experience, after which we discuss the community and societal effects of telecommuting, including its effects on traffic and emissions, business continuity, and work opportunities, as well as the potential impact on societal ties. Selected examples of telecommuting legislation and policies are also provided in an effort to inform readers regarding the status of the national debate and its legislative implications. Our synthesis concludes by offering recommendations for telecommuting research and practice that aim to improve the quality of data on telecommuting as well as identify areas of research in need of development.

Keywords

telecommuting, telework, remote work, flexible work, flexplace, distributed work

Introduction

Telecommuting has become an increasingly popular topic in the public interest. A bright spotlight was thrown

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on the practice in February 2013 when there was media uproar after Yahoo CEO Marissa Mayer banned Yahoo employees from working from home (Guynn, 2013). Mayer stated that the ban was necessary in order to foster a collaborative, inventive environment. Critics referred to the move as a return to the Stone Age and accused Mayer of being out of touch (Goudreau, 2013). Not long after, Best Buy CEO Hubert Joly ended the company's highly touted "Results-Only Work Environment" (ROWE) program, which permitted employees to work from any location at any time as long as the work was done. Joly stated that the program was "fundamentally flawed from a leadership standpoint" and that there was a need to mobilize employees in an effort to turn around the troubled company (Schafer, 2013). Revocation of the option to telecommute within these well-known organizations ignited a national debate concerning the merits of the practice.

Controversy over telecommuting is not surprising, in that the practice represents a fundamental change in how organizations have historically done business and has implications for a wide range of issues, such as work-family balance, greenhouse emissions, and the expansion of work opportunities (e.g., Gajendran & Harrison, 2007; Kitou & Horvath, 2006; West & Anderson, 2005). Moreover, comprehensively understanding outcomes associated with telecommuting is challenging in that research on the topic comes from a variety of fields that include psychology, management, transportation, communication, and information systems, the results of which are often conflicting (Allen, Johnson, Kiburz, & Shockley, 2013; Bélanger, Watson-Manheim, & Swan, 2013; Fay & Kline, 2012; Golden & Veiga, 2005).

Our aim in the current article is to review the science concerning telecommuting in an effort to separate fact from fiction. Specifically, we bring to the surface some of the intricacies associated with telecommuting research and review the expansive literature concerning the benefits and potential drawbacks associated with telecommuting. In addition, we examine relevant legislation and organizational policies and offer best-practice and policy recommendations.

Our article unfolds as follows. We begin by providing a history of telecommuting practices and prevalence statistics. We next discuss different types of telecommuting arrangements and the definitional challenges found in the literature. After providing this backdrop, we review findings concerning employee work-family issues, attitudes, and work outcomes. The next sections cover important contextual issues such as the nature of work while telecommuting, interpersonal processes, and additional individual and organizational considerations. We next review community and societal effects associated with telecommuting. Our final two sections provide a review of telecommuting policies and legislation, followed by implications and recommendations for research and practice.

History and Prevalence

History

A myriad of factors have contributed to the increased interest in and use of telecommuting over the past several decades within the United States. Sparked by the oil crisis, telecommuting first entered the U.S. public vernacular in the 1970s. The term is thought to have been coined in 1973 by Jack Nilles, who was an engineer working on projects for the National Aeronautics and Space Administration (Avery & Zabel, 2001). The idea at the time was to move the work to workers rather than move workers to the work in an effort to alleviate traffic problems and reduce energy consumption. Soon after, federal and state governments began funding demonstration projects to examine the feasibility and effectiveness of telecommuting. By 1997, 10,000 federal government employees were working from home or from other remote locations (Avery & Zabel, 2001).

Private companies in the 1970s realized that telecommuting could also be used to help address workforce issues. Companies such as Control Data Corporation and IBM began exploring work-at-home arrangements as a way to recruit and hire computer programmers who were in high demand but short supply (Avery & Zabel, 2001; Caldow, 2009). Additionally, as the number of dual-earner couples climbed in the 1970s and 1980s, telecommuting was touted as an option for helping individuals manage work and family responsibilities.

The evolution and growth of telecommuting is also linked to advancements in technology and to changes in the economy. Opportunities for telecommuting increased along with the capabilities of home computing. Since the introduction of personal computers in the 1980s and laptops and cell phones in the 1990s, the prices and sizes of these devices have decreased while the speed and bandwidth have increased (Kizza, 2013). As these technologies have advanced, increasing numbers of office workers have become able to work from outside the office. Moreover, the shift from a manufacturing to an information economy has expanded the number of jobs that lend themselves to telecommuting (Kizza, 2013).

In the 1990s, organizations were further motivated to develop telecommuting work arrangements in response to The Clean Air Act. The Clean Air Act was established in 1970, with major revisions occurring in 1977 and 1990 (Environmental Protection Agency, 2007). It requires states to develop enforceable plans intended to achieve and maintain air-quality standards. This includes regulating pollutants from motor vehicles. The 1990 amendments

required states to revise their plans to call for employers to develop employee commute option programs. The development of telecommuting arrangements was one way to satisfy the requirement (Goluboff, 2001). Passage of the Americans with Disabilities Act (ADA) in 1990 further spurred interest in telecommuting as a way to expand the hiring of disabled workers (Goluboff, 2001). The ADA requires employers to make reasonable accommodations for the disabled, and permitting a qualified employee with a disability to work from home is one form of reasonable accommodation (U.S. Equal Employment Opportunity Commission, 2005).

Prevalence

Prevalence rates for telecommuting vary considerably because of the different ways in which telecommuting is operationalized (e.g., working from home full-time vs. part-time), the different samples studied (e.g., inclusion of any type of remote worker), and the use of different sampling strategies (e.g., focus on large vs. small firms) across studies (Mokhtarian, Salomon, & Choo, 2005). Moreover, two types of data are typically reported: the number or percentage of firms that offer telecommuting, and the number or percentage of employees who telecommute. We urge readers to take these factors into consideration when reviewing any data concerning prevalence rates.

The Society for Human Resources Management (SHRM) conducts an annual survey of randomly selected human resource professionals from their approximately 275,000 individual members who work for firms of various sizes. Respondents are asked to report on benefits offered at their organization. Data from these surveys suggest that in 2014, 59% of U.S. employers allowed for some form of telecommuting. More specifically, 54% of respondents indicated that their organizations offered telecommuting on an ad hoc basis (i.e., intermittently throughout the year or as a one-time event), 29% on a part-time basis, and 20% on a full-time basis (Society for Human Resources Management, 2014). These percentages have not significantly changed from 2010 to 2014. WorldatWork is another human resources association that tracks employee benefits around the globe. Their 2013 survey of members indicated that 88% of organizations offered telecommuting in some form. Telecommuting on an ad hoc basis was most common (83%), with telework offered on a full-time basis less prevalent (34%).

In a poll conducted by Ipsos/Reuters in 2011 across 24 countries, about one in five employees reported telecommuting frequently, and nearly 10% reported working from home every day (Reaney, 2012). The study indicated that telecommuting is especially common in India, Indonesia, and Mexico. Data from the American Community Survey showed that 2.6% of the U.S. employee workforce (3.3 million people, excluding self-employed and unpaid volunteers) report that their home is their primary place of work (Global Workplace Analytics, 2015). These data also suggest that the number of telecommuters is growing. In 2005, estimates indicated that 1,819,355 workers telecommuted for at least half of their time spent working. The number grew to 3,268,525 in 2012 (Global Workplace Analytics, 2015). Estimates of less frequent telework are substantially larger, suggesting that as many as 25 million workers telecommute at least one day per month (Global Workplace Analytics, 2015). In sum, telecommuting impacts a significant number of organizations and workers.

Types of Telecommuting and Definitional Challenges

A significant challenge in reviewing the scientific findings on telecommuting involves the varied definitions and conceptualizations of telecommuting employed within the existing literature. Although the term *telecommuting* has been in use for decades, researchers have used various terminologies and conceptualizations when reporting results of telecommuting studies. The lack of a commonly accepted definition and conceptualization has significantly hindered our understanding of this work mode, since results are often not comparable across studies. Within this section, we therefore not only offer what we believe to be an accurate and encompassing yet parsimonious definition of telecommuting but also take a brief look at the various terms and definitions that have been used within the existing literature.

Telecommuting has been referred to as *telework, remote work, distributed work, virtual work, flexible work, flexplace*, and *distance work*, among other labels. These various terms, while overlapping, often embody different conceptualizations of telecommuting. Even across studies that have used the identical label of *telecommuting*, the actual definition offered may vary. This ultimately impacts the types of study designs and samples that researchers use to study telecommuting. The issue is further compounded by a disjointed literature stemming from multiple disciplines (e.g., transportation, information systems, management, communication, psychology, real estate, and operations) that have different emphases and do not always reference each other's work. Taken together, divergences in definitions and research focuses make it difficult to comprehensively synthetize knowledge of this work mode.

Table 1 provides example alternative terms that have been used within the existing literature. This summary suggests that different terms also often represent different conceptualizations. Specifically, the term *telework* is generally used to connote a broader form of telecommuting that

Table 1. Sample of Telecommuting Definitions Used in the Literature

Term used	Definition	Publication
Distributed work	Employees work over geographical boundaries and to some extent work with computer-mediated communication in order to achieve a common goal	Bosch-Sijtsema, P. M., & Sivunen, A. (2013)
Flexible work arrangements	Alternative work options that allow work to be accomplished outside of the traditional temporal and/or spatial boundaries of a standard workday	Shockley, K. M., & Allen, T. D. (2007)
Remote work	A work arrangement in which the employee resides and works at a location beyond the local commuting area of the employing organization's worksite; generally includes full-time telework and may result in a change in duty location to the alternative worksite	U.S. Office of Personnel Management. (2013)
Telecommuting	The use of telecommunications technology to partially or completely replace the commute to and from work	Mokhtarian, P. L. (1991a)
	Working some portion of time away from the conventional workplace, often from home, and communicating by way of computer-based technology	Golden, T. D. (2006b)
	Work conducted from home that is often supported by telecommunications technology	Kossek, E. E., Lautsch, B. A., & Eaton, S. C. (2006)
	Work arrangement in which employees perform their regular work at a site other than the ordinary workplace, supported by technological connections	Pinsonneault, A., & Boisvert, M. (2001)
	The use of information and communication technologies to replace or substitute for work environments that require individuals to commute to a traditional office	Bélanger, F., Watson-Manheim, M. B., & Swan, B. R. (2013)
	Systems that enable employees to perform regular, officially assigned duties at home or at alternative work sites geographically convenient to their residences	Pearce, J. (2009)
Telework	Work performed by (a) those whose remote work is from the home or a satellite office, (b) those whose telework is primarily in the field, and (c) those whose work is "networked" in such a way that they regularly work in a combination of home, work, and field contexts	Morganson, V. J., Major, D. A., Oborn, K. L., Verive, J. M., & Heelan, M. P. (2010)
	A form of work organization in which the work is partially or completely done outside the conventional company workplace with the aid of information and telecommunication services	Konradt, U., Schmook, R., & Malecke, M. (2000)
	Work that relies on technology-mediated communication and sophisticated information-processing capabilities instead of colocation for the production and delivery of work outputs	Garrett, R. K., & Danziger, J. N. (2007)
	A work arrangement in which employees perform their regular work at a site other than the ordinary workplace, supported by technological connections	Fonner, K. L., & Roloff, M. E. (2010)
Virtual teams	Spatially or geographically dispersed work arrangements that are generally characterized by a relatively short life span, technology-enhanced communications, and a dearth of face-to-face interaction	Tworoger, L. C., Ruppel, C. P., Gong, B., & Pohlman, R. A. (2013)

involves working from a variety of alternative locations outside of the central office (including full-time work from home but not necessarily limited to home-based work) and includes work from home-based businesses, telecenters, and call centers, and even work within an organization's central office between individuals who are interacting through the use of technology. *Telework* has also tended to be a term used more frequently in the literature outside of the United States, often in research published through European or Australian outlets. Similarly, the term *virtual work* is a broader term often used to describe individuals, groups of individuals, or organizations who do not interact face-to-face because of geographic dispersion yet who interact using technology in some fashion. Additionally, the term *flexible-work arrangements* as used in the literature encompasses telecommuting but often includes a broad array of flexible work programs such as flextime and compressed work weeks, and therefore offers a more generalized view of telecommuting than most literature focusing on the conceptualization considered in this review. Finally, the terms *remote work* and *distributed work* are generally considered broader than telecommuting and can denote

any form of work not conducted in the central office, including work at branch locations and differing business units.

Based on the above and a review of the literature, we therefore offer the following definition of *telecommuting*; following this definition, we offer some important clarifications and distinctions related to this definition in which we further clarify and differentiate this definition from others that have been used within this wide body of research: *Telecommuting is a work practice that involves members of an organization substituting a portion of their typical work hours (ranging from a few hours per week to nearly full-time) to work away from a central workplace—typically principally from home—using technology to interact with others as needed to conduct work tasks*. This definition of telecommuting is based heavily on several widely adopted conceptualizations (e.g., Bailey & Kurland, 2002; Gajendran & Harrison, 2007; Golden & Veiga, 2005; Golden, Veiga, & Simsek, 2006; Konradt, Schmook, & Malecke, 2000; Mokhtarian, 1992; Pinsonneault & Boisvert, 2001), including the one originally provided by Jack Nilles (1994), and includes several key points and distinctions. Specifically, individuals who telecommute:

a. substitute time typically spent in the central office with time spent working away from other employees, rather than working additional overtime hours that might be carried out after a full day in the office;
b. do so for a portion of their regular work time, ranging from a few hours per week to nearly full-time, with hours spent telecommuting tending to follow a set pattern for individual telecommuters but potentially varying among telecommuters in any one organization;
c. are part of a larger organization, as opposed to independent contractors or those who are part of an outsourced labor pool;
d. work principally within their home during telecommuting periods, with an occasional period possibly spent elsewhere;
e. use some form of information or communication technology to interact as needed with others both within and external to their central office during telecommuting periods.

In our view, telecommuters do not include mobile workers who do not typically work from a central office (e.g., employees who do not have an office or whose work is typically at a customer site, such as an on-site equipment-repair person). Moreover, in our view, telecommuters do not typically include employees who work primarily at telecenters during their periods away from the office, although there are some who consider this a form of telecommuting and we acknowledge this possible addition to what is considered telecommuting. Finally, in our view, telecommuting practices may involve some degree of scheduling flexibility, wherein the tasks completed at home vary in schedule from day to day or are partially carried out during what are considered nonstandard work hours in the telecommuter's work organization (e.g., in the evening), although as noted above in point (a), telecommuting does not include time spent working at home after a full day in the central office.

In offering the above definition of telecommuting and considering the broad and widely varying conceptualizations of work practices that have sometimes been considered using the term *telecommuting*, we note that our definition of telecommuting may not fully specify all of its possible conditions (or we might end up with what could be akin to a lengthy legal document!). Nonetheless, based on our encompassing review of the literature, we suggest that future researchers utilize the above definition, or encompass and specify the above-listed key aspects within their definitions, to ensure consistency and an understanding of boundary conditions within the literature. At a minimum, our advice to future researchers is to be clear about the definition of telecommuting that is being used within a given research study and to specify as much as possible the above-noted aspects generally considered within the realm of telecommuting.

In our review of the telecommuting literature, all definitions had in common the premise that telecommuting involves working at a remote location away from a central office. In addition to this accepted premise, most also encompassed the notion of the use of technology to complete work while working away from the central office. As shown in the examples provided in Table 1, beyond these two generally accepted premises, many definitions lacked an acknowledgment of the variance in the extent of telecommuting practiced (from a few hours per week to nearly full-time), the type of employment relationship (e.g., part of a larger organization, home-based business, or outsourced independent contractor), and the location of primary work done outside the central office (e.g., home, locations outside of major cities but near residences, call centers, sales locations, hotels, airports). This lack of specificity and wide variation in the definitions of telecommuting used within research studies has led to differing conclusions being drawn, with important implications for when researchers attempt to summarize the state of scientific findings on telecommuting in reviews of the literature (as in this review or as in other reviews). These differing definitions and ambiguity in the definitions applied within particular studies have led to the use of widely divergent sample

characteristics, and thus have added confusion to the literature. Taken together, this underspecification in telecommuting definitions has provided mixed signals to corporate leaders and policymakers seeking to harness telecommuting's advantages.

Despite the variety of definitions and conceptualizations used in the telecommuting literature, below we attempt to summarize the scientific findings. We caution, however, that in order to be encompassing in our review, we have included studies that may have relied on slightly different conceptualizations of telecommuting than that offered above. As in any scientific analysis, the trade-offs of breadth versus depth may lead to differing conclusions, and we urge readers to account for this in their interpretation of our summary.

Interpreting How the Extent of an Individual's Telecommuting Alters Scientific Findings

Another key challenge in reviewing the scientific findings on telecommuting involves considering the extent to which telecommuting was practiced by participants in each study. Up until relatively recently, few studies reported the extent or the frequency (also referred to as *intensity*) of individuals' telecommuting. Telecommuting is rarely an all-or-nothing work practice, and the frequency with which work is done away from the central office is likely to make a difference. For example, a person who telecommutes one day per month is likely to have different experiences than a person who telecommutes four days per week. Therefore, not considering the extent of telecommuting practiced by study participants allows for inappropriate conclusions to be drawn from scientific findings.

Early telecommuting studies advanced the field by comparing telecommuters with nontelecommuters (e.g., Crossan & Burton, 1993; DuBrin, 1991; Fritz, Narasimhan, & Rhee, 1998; Igbaria & Guimaraes, 1999). Such studies often reported on telecommuting pilot studies or compared larger groups of in-office employees with smaller groups of telecommuters. Typically, the amount of telecommuting practiced by participants was not measured or reported. These studies helped shape the field and provided evidence for practitioners to consider in managerial decisions, yet they made accurate comparisons difficult, particularly when results were inconsistent. Similar to the general notion regarding the appropriate dosage for medication, finding the right amount of time to telecommute may be the key to producing desired outcomes, because too little or too much might not have the intended effect.

Building on this realization, more recent research has begun to offer a deeper understanding of telecommuting by investigating how the extent of telecommuting practiced by an individual might impact or relate to work outcomes. This differentiation in the literature, brought largely to the forefront by a series of studies (Golden, 2006a, 2006b, 2007, 2012; Golden & Raghuram, 2010; Golden & Veiga, 2005; Golden, Veiga, & Dino, 2008; Golden, Veiga, & Simsek, 2006; Morganson, Major, Oborn, Verive, & Heelan, 2010; Virick, DaSilva, & Arrington, 2010), provides a means to understand how variation in the frequency of telecommuting alters work outcomes. The chief distinction stems from examining how much time is spent away from the central office, assessed either as the amount of time or the proportion of total work time.

Research investigating how the extent of telecommuting might alter work outcomes has revealed a number of findings useful to academics and practitioners. For example, several studies have found that job satisfaction is highest among individuals who telecommute a moderate amount compared to those who telecommute either a small amount or more extensively (Golden, 2006b; Golden & Veiga, 2005; Virick et al., 2010). Additionally, the extent of telecommuting has been positively associated with organizational commitment and negatively associated with intent to leave the organization, such that more extensive telecommuting has been associated with greater commitment to the organization and lower turnover intentions (Golden, 2006a). The extent of telecommuting has also been investigated for its effect on relationships—namely those that exist between telecommuters and their supervisors, coworkers, and family—and their subsequent impact on job satisfaction (Golden, 2006b). This research suggests that these relationships are differentially impacted as telecommuting becomes more extensive and change in a nonlinear fashion as a function of how much telecommuting is carried out. Specifically, more extensive telecommuting has been associated with enhanced relationship quality with leaders, decreased relationship quality with coworkers, and progressively lower work-family conflict. Alterations in these relationships have in turn been found to be positively associated with telecommuters' job satisfaction, and these changes generally become more pronounced as telecommuting reaches higher levels.

A number of studies have investigated the extent of or time spent telecommuting as a moderating variable, which has yielded additional insights. For example, time spent telecommuting has been found to play a moderating role in the relationship between professional isolation and both job performance and turnover intentions (Golden et al., 2008). Individuals who spent more time telecommuting exhibited lower job performance as a result of professional isolation than did those who spent little time telecommuting. However, those individuals

who spent more time telecommuting were also less apt to leave the organization despite their professional isolation. In another study, individuals with high-quality supervisory relationships who also telecommuted extensively experienced the highest levels of commitment, job satisfaction, and job performance (Golden & Veiga, 2008).

Thus, as evidenced by the above-reviewed research, the extent of telecommuting is an important consideration. Although this distinction has been accounted for in some studies, much of the existing research has overlooked it. In our further review of areas of research below, we purposively take into account research—when it exists—that has considered the extent to which an individual telecommutes.

Work and Family/Nonwork

Substantial interest in public policy concerning telecommuting and flexibility has been spurred by the notion that telecommuting can help individuals navigate work and family challenges. Indeed, public-policy advocates have called for greater adoption of workplace flexibility practices as a way to help working families (e.g., Jarrett, 2010; Miller, 2011). Within the work-family literature, work-family conflict has been a major topic of study (Allen, 2012). Grounded in theories of role stress and interrole conflict, work-family conflict is defined as "a form of interrole conflict in which the role pressures from the work and family domains are mutually incompatible in some respect" (Greenhaus & Beutell, 1985, p. 77). The direction of the conflict is commonly distinguished. That is, work can interfere with family (WIF), and family can interfere with work (FIW). We use work-family conflict as an umbrella term to convey work-family conflict in general or without direction and the acronyms WIF and FIW to denote directional work-family conflict.

Although telecommuting and other forms of flexible work have long been promoted as a means for enabling individuals to effectively manage their work and nonwork lives, there is little empirical evidence to suggest that telecommuting is a generally effective way to mitigate work-family conflict. Several meta-analytic studies have been conducted to review the literature on telecommuting and work-family conflict. Gajendran and Harrison (2007) reported an effect size (r) of −.16 for the association between telecommuting and WIF (95% CI = [−.19, −.08]) and an effect size (r) of −.15 for the association between telecommuting and FIW (95% CI = [−.21, −.07]). The confidence intervals for both of these effects did not include zero, supporting an effect that is small but reliably different from zero. In contrast, Allen et al. (2013) reported a meta-analytic effect size of (r) −.08 for WIF (95% CI = [−.15, −.01]) and a nonsignificant effect size of −.01 for FIW (95% CI = [−.07, .05]). Allen et al. took special care to include only studies that had used clear directional measures of WIF and/or FIW, which could account for some of the differences across the two studies.

Consistent across both meta-analyses was the indication that there is a great deal of heterogeneity associated with the relationship between telecommuting and work-family conflict, suggesting that there are moderators that impact the strength of the relationship. Gajendran and Harrison (2007) found that telecommuting intensity was a moderator, such that the beneficial relationship between telecommuting and work-family conflict was significant in high-intensity arrangements (operationalized as telecommuting for 2.5 or more days per week; r = −.16, 95% CI = [−.18, −.13]) but not in low-intensity arrangements (r = −.05, 95% CI = [−.10, .00]). Primary research that has examined intensity with directional measures of work-family conflict suggests that the direction of the conflict may make a difference. Specifically, Golden et al. (2006) reported that the extent of telecommuting was negatively associated with WIF, such that the more individuals telecommuted, the less their work interfered with their family. Conversely, with more extensive telecommuting, higher FIW was found.

Gajendran and Harrison (2007) also found that experience with telecommuting arrangements mattered. Specifically, telecommuting was associated with a more beneficial relationship with work-family conflict among employees who had been telecommuting for over a year (r = −.22, 95% CI = [−.17, −.27]) relative to those with less than a year's experience (r = −.12, 95% CI = [−.21, −.03]), suggesting that greater experience enables individuals to better capitalize on telecommuting. Both meta-analyses tested for the percentage of women in the samples as a moderator, with null results (Allen et al., 2013; Gajendran & Harrison, 2007). In addition, Allen et al. (2013) found no evidence that parental status, marital status, or weekly work hours acted as moderators of the relationship between telecommuting and work-family conflict. In sum, the preponderance of the research evidence suggests an association between telecommuting and WIF with an effect size that is small in magnitude but reliably different from zero, but there is little evidence supporting a nonzero relationship between telecommuting and FIW.

There are several potential explanations for minimal relationship between telecommuting and work-family conflict, particularly FIW. Working from home may increase the amount of family responsibility assumed by the remote worker (e.g., Hammer, Neal, Newsom, Brockwood, & Colton, 2005), thereby increasing opportunities for FIW to occur. For example, the telecommuter may be expected to be the family member who deals with home-repair workers, daytime appointments, errands, and so on. Thus, to realize a benefit in terms of management of work and

family, it may be important for individuals who work from home to establish clear boundaries and expectations with family and friends (Hamilton, 2002).

Another factor that can mitigate the potential for telecommuting to be beneficial in terms of work-family management is telecommuting's blurring of the boundary between work and family. Creating and maintaining boundaries has been referred as a fundamental aspect of human nature (Nippert-Eng, 1996). The management of work and family boundaries concerns the socially constructed lines of demarcation between work and family roles and the ways in which individuals maintain, negotiate, and transition across these lines (Ashforth, Kreiner, & Fugate, 2000). Boundaries may be physical, temporal, emotional, cognitive, and/or relational. Effective boundary management is thought to be important in that it facilitates performance in both the work and the family role (Ashforth et al., 2000; Kossek, Lautsch, & Eaton, 2006). As telecommuting often involves conducting work within one's domestic space, it erases the physical demarcation between work and home. Moreover, the availability of technological tools that permit individuals to remain connected to work (e.g., via e-mail) at all times blurs the temporal work-home boundary (Olson-Buchanan & Boswell, 2006). The physical and temporal flexibility associated with telecommuting may enable individuals to more readily switch between work and family roles, but it may also increase interrole interruptions and distractions and, thus, role conflict. Connectivity via technological devices also creates the demand to work more hours and to check e-mail outside of normal working hours (Madden & Jones, 2008). Noonan and Glass (2012) suggested that telecommuting contributes to the "work devotion schema" in that it is associated with the erosion of normal working hours. Based on data from the nationally representative National Longitudinal Survey of Youth and special supplements from the U.S. Census Current Population Survey, Noonan and Glass reported that the probability of working overtime is higher for telecommuters than for nontelecommuters.

When evaluating the body of literature concerning work-family conflict and telecommuting, it is important to consider the methodological limitations associated with this literature. The vast majority of the studies have been based on single-source, cross-sectional designs. This is important because individuals with a greater degree of work-family conflict may purposively seek out telecommuting under the belief that it will help them better manage their work and family roles. In the absence of controlled experimental studies, we cannot say with certainty whether or not telecommuting reduces work-family conflict in either direction. Another consideration is that many studies use a dichotomous (yes/no) measure of telecommuting use. Such approaches do not account for frequency of telecommuting and neglect the diversity that exists within both the telecommuting and the nontelecommuting groups. This is important in that Koh, Allen, and Zafar (2013) found that reasons for not telecommuting among nontelecommuters were associated with meaningful variance in reports of work-life balance. Specifically, individuals who were not telecommuting by choice reported the greatest mean level of work-life balance, followed by telecommuters and then individuals who were not telecommuting for other reasons, such as lack of technical support. These findings suggest that dichotomous comparisons of telecommuters versus nontelecommuters may mask important differences in work-family outcomes.

Work-Related Outcomes

A host of work-related outcomes have been investigated in relation to telecommuting. They include job satisfaction, organizational commitment and identification, stress, performance, wages and career potential, withdrawal behaviors, and firm-level metrics. Each are reviewed below.

Job satisfaction

A topic of considerable interest to organizational scholars is the relationship between telecommuting and employee attitudes. The attitude that has received the most empirical attention is job satisfaction. Based on a meta-analysis of 28 primary studies, Gajendran and Harrison (2007) reported that telecommuting is positively associated with satisfaction, although the magnitude of this effect was small (r = .09, 95% CI = [.07, .11]). However, research suggests that not all frequencies of telecommuting relate similarly to job satisfaction (Golden, 2006a; Golden & Veiga, 2005). Specifically, the relationship between the extent of telecommuting and job satisfaction is curvilinear, such that satisfaction and amount of telecommuting are positively related at lower levels of telecommuting, but satisfaction plateaus at higher levels of telecommuting (around 15.1 hours per week). The explanation for this curvilinear effect may lie in the social and professional isolation that telecommuters face when telecommuting frequently. This lack of social interaction may offset any gains in job satisfaction afforded by other benefits associated with telecommuting. Moreover, this curvilinear relationship is moderated by several variables; the curve is flatter for individuals with jobs higher in discretion and interdependence and for individuals higher in performance-outcome orientation (Golden & Veiga, 2005; Virick et al., 2010). These findings highlight the important role of job and person context in the attitudinal implications of telecommuting arrangements.

In an attempt to understand processes linking telecommuting to job satisfaction, several researchers have tested mediational models. Gajendran and Harrison (2007) did so meta-analytically, finding evidence that work-family conflict and coworker relationship quality both act as partial mediators between telecommuting status and job satisfaction. Additionally, Fonner and Roloff (2010) found a significant mediating effect of decreased work-life conflict, as well as decreased information-exchange frequency, stress from interruptions, and decreased involvement in office politics, based on a split sample of high-frequency telecommuters and standard office workers. Finally, Golden (2006a) found evidence that leader-member exchange, team-member exchange, and work-family conflict acted as partial mediators of the curvilinear association between extent of telecommuting and job satisfaction.

An additional line of research has focused on identifying factors that relate to the job satisfaction of telecommuters. Many of the studied variables are similar to variables linked to job satisfaction in nontelecommuting populations (cf. Kinicki, Schriesheim, McKee-Ryan, & Carson, 2002), including feedback (E. Baker, Avery, & Crawford, 2007) and high-quality relationships with coworkers and supervisors (Fay & Kline, 2011; Golden, 2006a). Other factors specific to the telecommuting arrangement that positively relate to job satisfaction include amount of technical and human resources support provided by the organization, manager's trust in the teleworker, amount of telework training others in the workplace have received, and minimal distractions from family members during work time (E. Baker et al., 2007; Hartman, Stoner, & Arora, 1991). In terms of personality, teleworkers with a greater tendency to seek order and a higher need for autonomy report greater job satisfaction than do teleworkers with lower needs for order and autonomy (O'Neill, Hambley, Greidanus, MacDonnell, & Kline, 2009).

Organizational commitment and identification

Organizational commitment and identification have also been studied as outcomes associated with teleworking. In their meta-analysis of eight studies (primarily dissertations), Martin and MacDonnell (2012) reported a small positive relationship between telecommuting and organizational commitment (r = .10, 95% CI = [.03, .18]). In a rare experimental study, Hunton and Norman (2010) observed that compared to workers in a standard arrangement, those who had the option to work at various locations (home, satellite office, or main office) had higher levels of organizational commitment, but there were no differences in commitment between the standard workers and those who were only permitted to work from home. This reinforces the notion that choice and flexibility in the telecommuting arrangement itself are critical. Moreover, focusing on the extent of telecommuting, Golden (2006b) reported that those who telecommute more tend to be more committed, but this effect was small.

As with job satisfaction, studies focused exclusively on telecommuters have aimed to understand predictors of commitment—namely, high-quality relationships with coworkers and supervisors, amount of social support received, coworker inclusionary and exclusionary behaviors, and communication satisfaction and competence (Fay & Kline, 2011, 2012; Golden & Veiga, 2008; Madlock, 2013). Similar predictors of organizational identification have been noted, including amount of social support received, amount of stress from interruptions, coworker inclusionary and exclusionary behaviors, and quality of relationships with coworkers (Fay & Kline, 2012; Fonner & Roloff, 2010; Wiesenfeld, Raghuram, & Garud, 2001). Additionally, research highlights that the nature of virtual work seems to be important for teleworkers' organizational identification. Those who have a higher social presence or feel that their communication media enables a sense of physical presence and involvement during work interactions report higher organizational identification (Fonner & Roloff, 2010). Also, the relationship between types of communication (phone, electronic) and organizational identification is moderated by the extent of the employee's telecommuting (Wiesenfeld, Raghuram, & Garud, 1999).

Stress-related outcomes

In addition to favorable job attitudes, telecommuting is also associated with significantly lower work-role stress (cf. Gajendran & Harrison, 2007; r = −.11, 95% CI = [−.15, −.07]) and work exhaustion (Sardeshmukh, Sharma, & Golden, 2012), although again the magnitude of these effects is rather small. Further, there is evidence that the relationships are partially mediated by increased autonomy (Gajendran & Harrison, 2007; Sardeshmukh et al., 2012). Some researchers (e.g., Duxbury & Halinski, 2014) have argued that the psychological mechanism driving the reduction in stress is the increased control afforded by many telecommuting arrangements. Moreover, it seems that extent of telecommuting and amount of telecommuting experience are both negatively related to work exhaustion (Gajendran & Harrison, 2007; Golden, 2006b).

Performance

Telecommuting has been linked to several metrics of importance to the organization's bottom line—namely, worker performance and productivity, wages, absenteeism, turnover,

and overall firm performance. Beginning with individual performance and productivity, meta-analytical research (Gajendran & Harrison, 2007) has suggested that telecommuting use is positively associated with supervisor-rated or objectively measured job performance (r = .18, 95% CI = [.09, .26]). In addition, recent research showed that supervisor-rated task and contextual performance were evaluated as higher for telecommuters than for nontelecommuters (Gajendran, Harrison, & Delaney-Klinger, 2014). In contrast, the meta-analytic correlation between telecommuting and self-rated job performance is not significant (r = .01, 95% CI = [–.01, .03]; Gajendran & Harrison, 2007). Although the source of this discrepancy in findings is unclear, an abundance of research (e.g., Borman, 1991; Harris & Schaubroeck, 1988; Mabe & West, 1982) has suggested that correlations between self- and other-reports of performance are often low, with self-reports generally inflated and less accurate than other-reports. Thus, it is possible that inflated telecommuter self-reports of performance create range restriction, deflating the correlation coefficient.

Wages and career potential

Research focused on performance in terms of success measures, such as individual wages and wage growth, has also produced mixed findings. Specifically, in a study of 159 women across a 7-year time period (from 1992 to 1999), researchers found that women who used telecommuting more frequently had lower wage growth than those who used it less, controlling for availability of the policy as well as work commitment and the number of children the women had during the study. This effect was strongest among women in professional or managerial jobs and those who stayed with a single employer over the course of the study (Glass, 2004). A larger study based on a nationally representative U.S. sample in 2000 and 2001 suggested the opposite effect, such that when telecommuting use was examined in relation to current wages, there was a positive association for both men and women. However, when wages 1 year later were considered and wages the prior year were controlled for, the associations were no longer significant (Weeden, 2005). The cross-sectional findings may be attributed to the fact that those with higher incomes and higher-level jobs are more likely to be able to telecommute than their counterparts with lower-paying jobs. Finally, Leslie, Manchester, Park, and Mehng (2012) examined use of several flexible work practices, including telecommuting, flextime, part-time work, and job sharing, in relation to Fortune 500 employees' current wages. Their results suggested that using flexibility is positively associated with income, although the effect size was very small.

Given the different sampling contexts, measurements of telecommuting, and time lags, it is difficult to decipher these discrepant findings; clearly, more research is needed on this important topic. With regard to subjective career-progression outlooks, a meta-analysis showed no significant association between telecommuting status and perceived career prospects (r = .00, 95% CI = [–.06, .07]; Gajendran & Harrison, 2007). Finally, some studies have suggested that those who request and/or use flexible work arrangements may be viewed as less committed to their career by others (e.g., Coltrane, Miller, DeHaan, & Stewart, 2013), and concerns about negative career consequences have been noted as a reason why individuals do not take advantage of flexible work arrangements when available (e.g., Allen, 2001).

Withdrawal behaviors

With regard to withdrawal behaviors, despite numerous anecdotes (e.g., Computer Economics Report, 2008; Silva, 2007; Smolkin, 2006) suggesting that a key benefit of telecommuting is reduced turnover, empirical research on the topic is very limited. In a study of 2,811 organizations in 14 European countries, Stavrou (2005) reported that whether or not an organization offered telecommuting was not significantly associated with turnover rates.

To our knowledge, there is no quantitative research linking individual telecommuting use to individual turnover. However, quasi-experimental research based on a concept that involves elements of telecommuting, ROWE, has suggested that turnover is significantly reduced when employees are given greater flexibility (Moen, Kelly, & Hill, 2011). ROWE initiatives involve deemphasizing the need to be physically present at work for a certain number of hours each day and instead focusing on measurable results. Because ROWE gives employees control over both the timing and the location of their work, though use of neither is mandated, the effects of the telecommuting aspect of the program cannot be isolated.

Studies examining the relationship between telecommuting and turnover intentions are more prevalent. Meta-analytic estimates suggest a significant but quite small negative correlation between telecommuting and turnover intentions (r = –.08, 95% CI = [–.11, –.06]; Gajendran & Harrison, 2007). Further, Masuda et al. (2012) found that geographic region moderated this relationship, such that there was a significant negative association in Anglo countries but no effect in Latin countries.

Research focused on the association between telecommuting and absenteeism is also scarce. Two studies based on large databases with objective absenteeism measures found that telecommuting relates to reduced absenteeism even when controlling for several firm characteristics (Dionne & Dostie, 2007; Stavrou, 2005). Indirect evidence also stems from research examining the relationship between commute length and absenteeism. Van Ommeren

and Gutiérrez-i-Puigarnau (2011) estimated that absenteeism in a German sample would be reduced by 15% to 20% if commute distance were negligible (as it is when telecommuting), although VandenHeuvel and Wooden (1995) found that the relationship between commute time and absenteeism was present only for women in an Australian sample.

Firm-level metrics

Firm-level indicators of performance have received less empirical attention, but the evidence generally suggests positive benefits. Based on data from 156 Spanish companies, researchers found that firms with larger proportions of telecommuting employees also exhibited the greatest innovation and financial and relational performance (e.g., product and process innovation and labor, customer, and supplier relations), although performance ratings were subjective, based on the company CEOs' ratings as opposed to hard data (Martínez-Sánchez, Pérez-Pérez, de-Luis-Carnicer, & Vela-Jiménez, 2007; Martínez-Sánchez, Pérez-Pérez, Vela-Jiménez, & de-Luis-Carnicer, 2008). Another study limited to U.S. companies listed in *Working Mother* magazine's "The 100 Best Companies for Working Mothers" found that the amount of employee participation in work-from-home programs was positively related to firm profit, measured as actual operating income (Meyer, Mukerjee, & Sestero, 2001).

It is important to keep in mind that most telecommuting research has used non-experimental study designs, precluding inferences of causality. It is conceivable that only the highest performing or most conscientious individuals are given the opportunity to telecommute because they are highly trusted. In such cases, the higher productivity of telecommuters cannot be attributed to the arrangement itself. A similar argument could be made for high-performing firms; it may be that only those that are performing well can afford to take the "risk" of implementing telecommuting arrangements. The best way to tease apart issues of causality is through random assignment of participants (or similar organizations) to either a telecommuting or standard work arrangement.

To our knowledge, only two studies (both unpublished) have adopted a true experimental methodology in a field setting, only one of which manipulated actual telecommuting use. In a sample of Chinese call-center employees, Bloom, Liang, Roberts, and Ying (2014) found that those randomly assigned to telecommute were more productive based on objective data, more satisfied, and less likely to leave the organization than those working under standard arrangements. However, when productivity was held constant, they were less likely to be promoted. This may speak to the implicit biases held toward remote workers. Hunton (2005) experimentally manipulated the availability of various types of telecommuting work arrangements for medical coders. Those who were able to work in the home or satellite office and those who were able to work from any location (home, satellite office, or main office) were significantly more productive (a metric based on quantity and quality of coding over a 6-month period) than those who worked in only the main office and those able to work from home or in the main office. Those working from home only performed significantly worse than all other groups. Additionally, one study (Hill, Miller, Weiner, & Colihan, 1998) has addressed the telecommuting-performance question using a quasi-experimental design. IBM Western arbitrarily (but not randomly) assigned employees to work partially virtually or entirely in the traditional office. Post-implementation surveys suggested that those who worked virtually reported being more productive than did traditional workers.

Thus, these results based on studies with more rigorous designs seem to support cross-sectional research, but additional research with more diverse samples is certainly merited before drawing firm causal conclusions. Moreover, given the difficulty of conducting random-assignment experimental studies on a large scale, it would be useful to consider other analytic models (e.g., Rubin analytic model, regression-discontinuity approaches) to help support or refute causation in telecommuting studies (Hanges & Wang, 2012).

Nature of Work While Telecommuting

While there are a number of job-attitude and productivity benefits associated with telecommuting, clearly not all jobs or all tasks are suitable for this type of work arrangement. Consider operating a forklift, caring for a critically ill patient, or preparing and serving meals for restaurant customers. The nature of the work makes a difference. Work that is physically portable and/or can be done online is most amenable to being performed remotely. Relative to the total employed population, a disproportionate number of telecommuters can be found in professional, scientific, and management-related sectors and in industries that involve information, finance and insurance, and services (Lister & Harnish, 2011). It has been noted that the ability to work from home is tied to authority and status in that managerial and professional workers are more likely than others to engage in the types of tasks that can be performed remotely (Noonan & Glass, 2012). Jobs that involve measurable work output also lend themselves to telecommuting. Such quantification provides concrete information on telecommuter performance, which can offset managerial concerns with regard to lack of observation (Turetken, Jain, Quesenberry, & Ngwenyama, 2011).

A number of specific work characteristics have been examined as predictors, mediators, and moderators of various telecommuting outcomes, including autonomy, schedule control, and task interdependency. This is based on the notion that the effectiveness of telecommuting may be associated with the way in which individuals perform their work activities (Golden & Veiga, 2005).

Autonomy

Autonomy reflects the extent to which a job allows the freedom, independence, and discretion to make decisions and to choose the method by which job-related tasks should be completed (Hackman & Oldham, 1976). Autonomy has been found to moderate the relationship between the extent of telecommuting and WIF (Golden et al., 2006). Specifically, more extensive telecommuting has been found to be associated with lower WIF, and this relationship becomes more negative for telecommuters with lower job autonomy—that is, while telecommuters with high autonomy may experience a decrease in WIF, the drop in WIF is even greater for telecommuters in jobs with lower autonomy (Golden et al., 2006). Moderation has also been found when considering job satisfaction as the outcome (Golden & Veiga, 2005). Telecommuters with higher autonomy report greater job satisfaction relative to those with less autonomy. Thus, it seems that while telecommuting arrangements may be beneficial, the degree of benefit may be influenced by the amount of autonomy in the telecommuter's job as well as the outcome variable of interest.

Autonomy has also been examined as a mediator of the relationship between telecommuting and work-related outcomes, based on the notion that telecommuting enhances perceptions of autonomy and that stronger perceptions of autonomy in turn drive positive outcomes (Gajendran et al., 2014). Indeed, telecommuters report greater perceived autonomy than do nontelecommuters (Gajendran & Harrison, 2007; Gajendran et al., 2014). In their meta-analytic study, Gajendran and Harrison (2007) found that autonomy fully mediated the relationship between telecommuting and job satisfaction and partially mediated the relationships between telecommuting and supervisor-rated performance, turnover intent, and role stress. More recent research has also indicated that the greater the telecommuting intensity, the greater the perceived autonomy (Gajendran et al., 2014).

Schedule control

Telecommuting provides workers with location flexibility. Another form of flexibility is temporal flexibility. Temporal flexibility is captured by terms including *work-scheduling latitude, flextime, flexible work schedule*, and *schedule control*. All of these terms refer to the ability to adjust the scheduling of work tasks to suit the needs of the worker. Meta-analytic research has demonstrated that temporal flexibility is associated with a variety of positive outcomes such as employee productivity, job satisfaction, and low absenteeism (Baltes, Briggs, Huff, Wright, & Neuman, 1999).

Those who telecommute may or may not have control over the temporal aspect of their work. For example, some telecommuters may be required to log in to computer terminals during a fixed schedule, and their work may be continuously monitored. The extent to which telecommuting is associated with beneficial outcomes may depend on the level of scheduling flexibility. Some research has indicated that telecommuting and flextime interact in relating to outcomes. Golden et al. (2006) reported that schedule flexibility moderated the relationship between telecommuting and WIF, such that the relationship between the extent of telecommuting and WIF was stronger for telecommuters with greater schedule flexibility than for those with less schedule flexibility. Similar to autonomy, schedule control enables individuals to more effectively manage resources such as time and allocate them in a way that enhances telecommuting outcomes (Golden, 2006a).

Task interdependence

Task interdependence refers to the degree to which organizational members rely on one another to effectively perform their tasks (Morgeson & Humphrey, 2006). Jobs that involve a high level of interdependence also require a high level of coordination and interaction with others. A concern is that distributed physical work locations can make such coordination difficult and thus may temper positive outcomes from telecommuting (Golden & Veiga, 2005). Research has suggested that these concerns may be merited, as task interdependence has been found to have both main and interactive effects. Turetken et al. (2011) reported a negative relationship between task interdependence and productivity among a sample of telecommuters, such that telecommuters who reported that their job tasks were more interdependent also reported lower productivity. Golden and Veiga (2005) investigated task interdependence as a moderator of a curvilinear relationship expected between the extent of telecommuting and job satisfaction. They found that telecommuters with higher task interdependence reported a smaller increase in job satisfaction relative to those with lower task interdependence, with the impact most prominent when telecommuting was extensive.

Interpersonal Processes

Interpersonal relationships are an essential aspect of organizational life (Allen & Eby, 2012). Work itself is a

relational act, and interpersonal processes within the workplace shape employee attitudes and behaviors. Working at a location removed from regular face-to-face interactions with coworkers and supervisors alters the dynamics of work-related interpersonal processes. Moreover, resources and knowledge within the organization flow through relationship networks (W. Baker & Dutton, 2007). The disruption to social proximity represented by telecommuting may have profound effects, then, on social and professional isolation, communication, relationships with coworkers and supervisors, knowledge sharing, and innovation.

Social and professional isolation

Given that telecommuters are by definition away from the workplace, it is no surprise that social isolation has been identified as a key challenge faced by teleworkers (Feldman & Gainey, 1997). In an online poll of 11,383 workers across 24 countries, 62% of the respondents said that they found telecommuting socially isolating, and 50% feared that telecommuting could harm their chances of a promotion (Reaney, 2012). Moreover, physical absence from the workplace and subsequent reduced social participation with coworkers can result in social stigmatization.

Based on qualitative interview research, Cooper and Kurland (2002) reported that the extent to which telecommuters experience professional isolation depends on the extent to which developmental activities are valued in the workplace and the extent to which telecommuters miss those opportunities. Telecommuters mentioned that they missed the idle conversations in the hallway and other informal conversations that result in learning and knowledge sharing. Research investigating the outcomes associated with feelings of professional isolation among telecommuters is sparse, but extant work suggests that it is linked with poorer job performance and greater intent to leave one's organization (Golden et al., 2008). In a comparison of main-office and remote workers, main-office employees reported feeling a greater sense of inclusion than did home, satellite-office, and client-based workers (Morganson et al., 2010). Moreover, out of a variety of communication methods (e.g., telephone, e-mail, instant messaging, etc), employees reported that face-to-face interaction is most important for maintaining workplace friendships (Sia, Pedersen, Gallagher, & Kopaneva, 2014).

Workplace relationships

Meta-analytic research has investigated the relationship between telecommuting and workplace relationship quality. Gajendran and Harrison (2007) reported an association between coworker relationship quality and telecommuting status with a mean effect size (r) of .00 (95% CI = [−.03, .03]), indicating that telecommuting did not harm coworker relationships. However, telecommuting intensity was a significant moderator. Specifically, telecommuting was not related to coworker relationship quality under low-intensity telecommuting arrangements (r = .03, 95% CI = [.01, .07]), but it had a negative effect under high-intensity arrangements (r = −.19, 95% CI = [−.30, −.08]). Thus, the frequency with which an individual telecommutes appears to make a difference with regard to the impact of telecommuting on coworker relationships. Another consideration is the impact of telecommuting policies on the satisfaction of those who do not telecommute. Golden (2007) found that a higher prevalence of teleworkers in an organization was associated with less satisfaction with coworkers among employees who did not telecommute.

Relationships with supervisors may be the most important workplace relationship formed by employees (Dienesch & Liden, 1986). Bono and Yoon (2012) suggest that high-quality supervisor relationships (a) create physical, cognitive, social, and psychological resources; (b) nurture reciprocity; and (c) help satisfy the basic need to belong. Frequent face-to-face interaction is thought to facilitate the development of such relationships (Barry & Crant, 2000). Because telecommuting alters communication, there is the potential for harm to the quality of the relationships between telecommuters and their supervisors. Meta-analytic research, however, suggests that this concern may be unfounded. Specifically, Gajendran and Harrison (2007) reported a positive relationship between telecommuting and supervisor relationship quality (r = .12; 95% CI = [.05, .15]). They also tested if this relationship was moderated by telecommuting intensity and found that intensity did not make a difference (high-intensity condition: r = .13; low-intensity condition: r = .14). Caution is needed when evaluating the causal direction of this relationship. Given that the research was primarily based on cross-sectional work, it is possible that supervisors are more likely to grant telecommuting arrangements to employees with whom they have a high-quality relationship.

An interesting but less studied consideration is how managers who telecommute impact the work outcomes of their employees. Spatial distance may slow the speed of feedback and information exchanges between supervisors and employees. At least one study has found that work experiences and outcomes are less positive for employees whose managers telecommute (Golden & Fromen, 2011). However, another study based on 137 subordinates and their 41 leaders employed in various organizations found that the leaders' telecommuting status did not relate to subordinates' perceptions of their

communication effectiveness or performance (Neufeld, Wan, & Fang, 2010).

Overall, the research suggests that the quality of relationships, particularly relationships with coworkers, may be impacted by the extent of telecommuting practiced by the individual, and care must therefore be taken to ensure that any decrements in relationships are carefully managed. Moreover, it is important to recognize the impact that telecommuting policies can have on those who do not telecommute.

Knowledge sharing

Knowledge transfer refers to the process by which knowledge diffuses from one individual to other individuals within organizations (Taskin & Bridoux, 2010). As the workplace is a complex social community, the effective transfer of knowledge among employees is critical to the development of social capital and to organizational effectiveness (Cascio & Aguinis, 2008). Accomplishing tasks involves the exchange of information and interactions with coworkers (P. M. A. Baker, Moon, & Ward, 2006). Physical separation may impede such interactions. Moreover, knowledge transfer hinges on trust among coworkers (Alexopoulos & Buckley, 2013), and trust is more likely to occur via face-to-face over electronic communication (Rocco, 1998). Thus, telecommuting may endanger knowledge transfer within organizations (Taskin & Bridoux, 2010).

Surprisingly little research has actually assessed the impact of telecommuting on knowledge sharing. An exception is a study by Golden and Raghuram (2010), who studied teleworkers over a 6-month period. Telecommuters who reported more trusting relationships within their work unit, stronger interpersonal bonds with coworkers, and greater organizational commitment also reported greater knowledge sharing 6 months later. In addition, Golden and Raghuram tested for moderators and found that technological support and frequency of face-to-face interactions moderated the relationship between trust and knowledge sharing, such that the relationship was stronger with both higher technological support and greater frequency of face-to-face interactions. This is not surprising, given that people who are colocated communicate more frequently with one another (Fonner & Roloff, 2010). Even among employees who are colocated, the farther the distance between their desks, the less communication that occurs (Waber, 2013).

Organizations should also be concerned about the impact of telecommuting on the development of mentoring relationships, as they are a key mechanism for learning and knowledge transfer within organizations (Allen, Smith, Mael, O'Shea, & Eby, 2009). As reported by Cooper and Kurland (2002), professional isolation is inextricably linked to telecommuter development activities (e.g., informal networking, mentoring). By being away from the organization, telecommuters may have limited opportunities to network and to develop mentoring relationships.

Innovation

Knowledge sharing can be particularly critical for innovation. Firms such as Google that rely on innovative product and service creation eschew telecommuting among employees in favor of colocating employees in order to promote frequent coworker interactions (Schmidt & Rosenberg, 2014). Several studies using sociometric data, based on wearable sensor technology, have shown that frequency in face-to-face interactions is associated with creativity (Tripathi & Burleson, 2012) and with fewer dependencies (which are undesirable) on software code created by programmers (Waber, 2013).

Coenen and Kok (2014) looked at five case-study teams to better understand the consequences of telework for new-product performance projects. Knowledge sharing was important to the process. Findings also indicated that a base level of face-to-face contact was important to the quality of the knowledge sharing and that the need for face-to-face contact decreases as the development process progresses. This is consistent with previous work that showed that face-to-face teams performed best but were closely followed by virtual teams that had met face-to-face initially but then worked remotely. Teams that worked completely remotely had the lowest performance (Rocco, 1998).

In sum, work is a major source of connection with others and a way by which individuals fulfill the need to belong (Baumeister & Leary, 1995). Coworkers are a source of social support and help reinforce work-role identity (Ammons & Markham, 2004). Special efforts may need to be made to sustain work-role identities with coworkers and supervisors, particularly among individuals who telecommute extensively (Thatcher & Zhu, 2006). However, it is also important to consider that those who self-select to work from home may prefer working alone. Individuals may find ways to cope through identifying other means of social connection (Ammons & Markham, 2004). For example, needs for affiliation can be fulfilled by family members and through engagement with the community. Such issues have received little research attention. Individual and family considerations are discussed in the next section.

Additional Individual and Family Considerations

There are a variety of individual- and family-related considerations that come into play when considering the option to telecommute and the benefits that may be realized. Motivations for telecommuting, the impact of gender

and family status, and individual differences have been the subject of study.

Individuals have different motivations for wanting to telecommute (Bailey & Kurland, 2002). Two primary motives appear to underlie this desire: productivity and personal life (Shockley & Allen, 2012; Sullivan & Lewis, 2001; other motives—e.g., the desire to reduce commuting costs and to help the environment by driving less—have also been discussed; see Mokhtarian, Bagley, & Salomon, 1998). Productivity motives involve the desire to telecommute in order to increase efficiency and work performance (e.g., to avoid office politics and/or interruptions). Personal-life motives involve the desire accommodate nonwork needs (e.g., to attend to dependent care issues).

Gender differences in motives for telecommuting have been a topic of research. In one study, 30% of men compared to 18% of women reported the ability to "get more work done" as the most important advantage of telecommuting (Mokhtarian et al., 1998). Shockley and Allen (2012) investigated motives for using flexible work-location arrangements and variation in gender and family responsibility. Contrary to expectations, they found no gender differences with regard to the life-management motive (i.e., personal-life motive), but women were more likely than men to espouse work-related motives for using flexible work-location arrangements. Shockley and Allen (2012) also reported that individuals with greater family responsibility were more likely to endorse life-management motives than were individuals with less family responsibility. Some telecommuters try to work from home while also engaging in dependent care, and research suggests that women are more likely to do so than men (Olson & Primps, 1984; Sullivan & Lewis, 2001). Due to the high cost and low availability of childcare, such arrangements may be viewed as the only option for combining paid work and childcare. Childcare and home responsibilities can be a major distraction when home-based telecommuters blend them with their paid employment (Kraut, 1989). Moreover, such arrangements can bind the worker to the home setting both physically and psychologically (Olson & Primps, 1984).

One identified family-related disadvantage that may result from working from home is that the telecommuter may be expected to shoulder greater household responsibility because that person "is home all day." Domestic partners may fail to appreciate the boundary between work and home. This may be especially true for female telecommuters. Hammer et al. (2005) found that use of flexible work arrangements (a composite measure that included both location and timing flexibility) was not related to husbands' reports of WIF or to FIW but was positively reported to wives' reports of FIW 1 year later. Thus, telecommuting on the part of women may reinforce the gendered division of labor (Sullivan & Lewis, 2001).

Gender differences in telecommuting use have also been investigated. Research focused on high-potential employees who had graduated from prestigious MBA programs indicated that women were more likely to use telecommuting than were men (39% vs. 29%, respectively; Beninger & Carter, 2013). Moreover, men were more likely to report that they had never telecommuted across the course of their career than were women (20% vs. 11%, respectively). Research has also found that women are less likely than men to have the option to telecommute, but they are more likely than men to choose to telecommute when they do have the option (Singh, Paleti, Jenkins, & Bhat, 2013). There is little evidence that gender shapes the relationship between telecommuting and outcomes. Out of 10 relationships tested in their meta-analysis, Gajendran and Harrison found that gender significantly moderated only two. The positive relationship between telecommuting and supervisor-rated performance was stronger among samples with a higher percentage of women. Similarly, the relationship between telecommuting and perceived favorable career prospects was more strongly positive among samples with a higher percentage of women. In their meta-analysis, Allen et al. (2013) also tested gender as a moderator of telecommuting (i.e., flexplace) use and its relationship with WIF/FIW, with null results.

Other individual differences may relate to the use and effectiveness of telecommuting. An individual-difference variable that has been investigated primarily in the work-family literature is the preference for integration versus segmentation of work and family roles. This preference is thought to fall along a continuum, with the preference for complete separation (i.e., segmentation) on one end and the preference for complete integration on the other (Ashforth et al., 2000; Kreiner, 2006). Most individuals fall somewhere between these two extremes. Because working from home is associated with role blurring, it might be expected that individuals with a stronger preference for segmentation would be less likely to telecommute than those who prefer integration. Findings to date have been mixed. Kossek et al. (2006) found that integration preferences were associated with less telecommuting among a sample of professionals employed by information- and financial-services organizations. In contrast, Shockley and Allen (2010) reported that integration preferences were associated with greater telecommuting intensity among a sample of university professors.

The ability to effectively work from home may be dependent on other individual differences. Planning behavior and other self-regulatory skills may enable individuals to effectively function in an environment that provides them with a great deal of control—such as when working from home (Lapierre & Allen, 2012). Specifically, individual characteristics that promote self-regulation enable individuals to focus on work tasks and

to ignore conflicting demands and cues (e.g., a pile of laundry). Raghuram and Wiesenfeld (2004) investigated structuring behavior as an important individual characteristic within a sample of telecommuters. Structuring behavior involves proactive strategies that are aimed at planning and organizing the workday. This may include creating a work environment that minimizes distractions, having a daily task schedule, and setting performance goals for the day. They found that extent of telework was positively associated with structuring behavior. In addition, those who reported using more structuring behavior also reported less job stress and less WIF and FIW.

Another individual difference that may be important to telecommuting effectiveness and is associated with self-regulation failure is procrastination. The tendency to procrastinate may be particularly relevant for productivity-related outcomes. O'Neill, Hambley, and Bercovich (2014) reported that greater procrastination was associated with greater cyberslacking and lower self-reported perception of performance while working remotely. Interviews with telecommuters have suggested that the ability to avoid distractions is important to being effective as a remote worker (Grant, Wallace, & Spurgeon, 2013).

In sum, it should not be assumed that employees are similarly desirous of, or are equally effective at managing, a telecommuting work arrangement. Research to date suggests that there are individual differences that promote effective telecommuting, such as planning behavior, and individual characteristics that may prohibit effective telecommuting, such as procrastination. There may be trainable skills (e.g., planning skills) that enable effective telecommuting; organizations may consider such training for employees who will spend a considerable amount of time working remotely.

Organizational Culture and Support

Notably, organizations such as Google and Apple that create products and platforms that make virtual work easier refrain from encouraging telecommuting, preferring instead to develop workplace cultures in which there is maximal social interaction (Schmidt & Rosenberg, 2014; Wasserman, 2014). Other companies have scaled back on telecommuting arrangements, citing the desire to contribute to a stronger and more innovative company culture (Hsieh, 2013). Both Hsieh (2013) and Waber (2013) have noted that our human biology, which is used to dealing with people face-to-face, has evolved more slowly than our technology.

For organizations that do offer telecommuting, as with any organizational practice, support from the organization is needed for it to be effective. Some research has shown that perceptions concerning how family-supportive the organization is relate to telecommuting use (e.g., Allen, 2001; Shockley, Thompson, & Andreassi, 2013; Thompson, Beauvais, & Lyness, 1999). Support from supervisors also plays a key role in the acceptance and administration of telecommuting work arrangements (Lautsch, Kossek, & Eaton, 2009). This is important in that in most organizations, employees have the right to ask to telecommute but supervisors can exercise the right to refuse the request (Kelly & Kalev, 2006). Supervisors have their own set of concerns associated with the administration and management of telecommuting arrangements. For example, coordination of interdependent tasks may be more challenging when team members are disbursed physically (Greer & Payne, 2014). Moreover, managers may be reluctant to permit employees to work from home because of the fear that if they cannot see employees, they cannot be sure that they are working. Depending on the nature of the work, monitoring of employee behavior may be more challenging.

In addition to support, effective management is critical. Telecommuting made the news in August 2014 when it was revealed that whistle-blower complaints had instigated an investigation by the U.S. Patent and Trademark Office. The investigators alleged that patent examiners working from home were repeatedly lying about the number of hours that they were working (Rein, 2014). The report suggested a culture of fraud in which senior leaders overlooked the systematic abuses occurring within the telecommuting program. Some have commented that the bad publicity associated with flexible work options has more to do with management than with actual remote-work arrangements (Lavey-Heaton, 2014).

Technology also plays a supporting role in facilitating effective telecommuting. Since the advent of telecommuting, the technology that supports it has continued to evolve. To optimize the success of remote work, communication tools that can best simulate face-to-face interactions and that inject social context are needed (Waber, 2013). According to media richness theory, communication media vary in their ability to enable users to transmit social cues, change understanding, and resolve equivocality (Daft & Lengel, 1986). For example, commonly used tools such as e-mail lack social richness in that gestures and emotion are difficult to transmit. Video tools are richer in that they convey some social cues, but the effectiveness of video tools such as Skype is hindered by a lack of eye contact due to the inability to look at the computer screen and the camera at the same time. Because we tend to look at the person on the screen rather than at the camera, it becomes impossible to maintain mutual eye contact, rendering communication unnatural (Giger, Bazin, Kuster, Popa, & Gross, 2014).

Developing telepresence systems provide an immersive experience that more closely mimics that of colocation. *Telepresence* refers to the sense of being physically present in a remote or simulated environment (Loomis, 1992). This is important, in that research shows that higher social richness and higher telepresence result in greater telecommuter motivation and greater sustained use of the system (Venkatesh & Johnson, 2002). Telepresence systems such as those developed by Cisco (e.g., IX5000 Series) create a lifelike meeting experience by capturing an entire room with high-definition video, theater-quality sound, and multiple shared content sources, but these are expensive. Although enhancing the social richness of communication systems can increase the effectiveness of *planned* interactions, they do not remedy the loss of the random "watercooler" conversations that occur among workers who are colocated. Use of applications such as Google Hangouts can foster the more serendipitous and informal interactions and socializing that can be missed when working remotely (Waber, 2013). In the future, virtual-reality and holography technologies may further recreate the office environment (Waber, 2013). Organizations such as IBM are experimenting with virtual technologies like Second Life (secondlife.com) as a tool for unified online communication and collaboration (Mueller, Hutter, Fueller, & Matzler, 2011). As technological advancements continue to be made, it should become easier for individuals to work remotely and to do so in a way that mitigates some of the disadvantages associated with telecommuting, such as social isolation.

Community and Societal Effects

Thus far, we have focused on variables associated with telecommuting that primarily reside at the individual and at the organizational level, but benefits to communities and society at large have also been a target of research. These potential benefits involve positive effects on traffic congestion and management, carbon emissions, business continuity, and work opportunities.

Traffic and emissions

Reducing the number of individuals commuting by automobile has the promise of reducing greenhouse emissions and taking pressure off transportation infrastructures by creating an alternative to increasing the capacity of streets and highways. Estimates indicate that traffic jams cost the U.S. economy $78 billion a year in lost productivity (Global Workplace Analytics, 2015). Gridlock is especially prevalent during morning and evening rush hours as workers make their way to and from city centers for work. Over the last several decades, urban planners and policymakers have suggested that telecommuting be used to reduce the number of automobiles on the road, especially at peak drive times (Zhu, 2012).

To understand the extent to which telecommuting helps reduce traffic and emissions, comparisons of telecommuters versus nontelecommuters concerning total vehicle miles traveled have been conducted. Using data spanning 1966 to 1999, Choo, Mokhtarian, and Salomon (2005) reported modeled data evidence suggesting that telecommuting across the United States reduced the annual national number of passenger vehicle miles traveled by 0.8% or less. This value was significant when using a 90% confidence interval, but not when a 95% confidence interval was applied. In contrast, based on repeated cross-sectional data from the 2001 and 2009 National Household Travel Surveys, Zhu and Mason (2014) reported that telecommuters travel a greater number of vehicle miles than do nontelecommuters. The authors estimated that relative to nontelecommuters, telecommuters on average traveled 38 vehicle miles more per day in 2001 and 45 more in 2009. Zhu (2012) found, after holding multiple factors constant, that telecommuters consistently had longer and more frequent daily total nonwork trips than did nontelecommuters, although the differences between the two groups diminished slightly over the 8-year period of the study. It is thought that the mileage saved by not traveling to a work location is offset by errands or other trips that would typically be chained with a commute to the office (e.g., stopping by the grocery store on the way home from work). In sum, research on this issue is inconclusive, but there does not appear to be robust evidence to suggest that telecommuting significantly reduces the number of vehicle miles traveled.

From an urban-planning perspective, research has also been conducted to determine if telecommuters live in more remote locations and might therefore contribute to urban sprawl. Based on a sample of Californian telecommuters, Ory and Mokhtarian (2005) found that telecommuters lived farther from work than did nontelecommuters; however, further analyses determined that telecommuting more often follows rather than precedes a relocation that lengthens commute distance. That is, the ability to telecommute allows rather than motivates individuals to live in a more distant location.

As noted by Kitou and Horvath (2003) the environmental benefits of telework depend on a complex array of factors that include commuting patterns, induced energy usage, and characteristics of the office and home space and equipment use. In their Monte Carlo simulation, they found that for a typical case reflective of U.S. telework patterns, telework may decrease some emissions (e.g., carbon dioxide) but have no effect on others (e.g., nitrous oxide). However, these impacts could be offset by an increase in home-related impacts (e.g.,

increased household energy usage). Shafizadeh, Niemeier, Mokhtarian, and Salomon (2007) summarized another Monte Carlo simulation by stating,

> While public sector benefits are conceivable, they remain insignificant in most situations because the impacts on the transportation network are probably not concentrated enough over a specific transportation corridor to realize infrastructure benefits and not quantified or valued enough within a regional air district to realize significant air quality benefits. Further, the public sector loses fuel tax revenue. (p. 12)

Business continuity

Another way in which telecommuting may offer societal benefits is by providing business continuity in the face of weather events, influenza outbreaks, and other emergencies that can disrupt business and government operations. Telecommuting can be part of a risk-mitigation strategy that enables organizations to ensure the continuation of vital services during disasters (Heng, Hooi, Liang, Othma, & San, 2012). For example, many organizations in California developed satellite work centers and telecommuting policies following the series of earthquakes in the late 1980s and early 1990s that damaged transportation systems (Avery & Zabel, 2001). The U.S. Federal Government requires telework arrangements as part of all emergency planning (Telework Enhancement Act of 2010). When Federal Government offices in the Washington, DC, area were closed for two days as a result of Hurricane Sandy in October 2012, about one-third of government workers were able to work remotely (Fritze, 2012).

Expanded work opportunities

Telecommuting can help provide expanded work opportunities in several ways. One is through increasing opportunities for disabled individuals to participate in the workforce. The rate of unemployment (defined as not having a job, available for work, and having been actively looking for a job for the prior 4 weeks) among those with disabilities was 13.2% in 2013, whereas the rate for those with no disability was 7.1% for the same time period (Bureau of Labor Statistics, 2014). Working from home may be a viable option for those who have environmental sensitivities, episodic symptoms, mobility impairments, and/or chronic pain or fatigue conditions. Telework can act as a form of reasonable accommodation under the ADA (P. M. A. Baker et al., 2006; West & Anderson, 2005), which requires employers with 15 or more employees to provide accommodation for applicants who are qualified and who have disabilities (U.S. Equal Employment Opportunity Commission, 2005). A reasonable accommodation is any change in the work environment or in the way work is customarily executed that enables a disabled individual to apply, perform, or gain equal access to the benefits and privileges of a job. Changing the location of where work is performed may fall under the ADA reasonable-accommodation requirement even if non-disabled employees are not permitted to telecommute (West & Anderson, 2005). Although telework is cited as a tool for aiding the disabled, there is little research on the ramifications of telework as an accommodation. Moreover, there are concerns that telecommuting may exacerbate the social isolation often experienced by the disabled, who are already stigmatized by society (P. M. A. Baker et al., 2006).

Telecommuting can also boost opportunities for workers who live in rural areas. Job losses in rural manufacturing, changes in technology, and increased global competition have all contributed to a decline in the rural population in the United States over the past decade (U.S. Department of Agriculture, 2014). Broadband projects intended to increase Internet connectivity in rural communities are being conducted in states such as Minnesota to help make it feasible for people to live and work in rural areas (Executive Office of the President, 2009). Similar initiatives are occurring across Europe and Australia (Simpson, Daws, Pini, & Wood, 2003). Within the United States, telecommuting arrangements can be used to reverse the trend of outsourcing jobs overseas (Ruth & Chaudhry, 2008). Rural outsourcing sends jobs from high-wage urban areas to rural areas in which salaries are lower, enabling individuals to remain in geographic locations that provide a low cost of living (Smith, 2010). For many, the ability to remain a long-term resident of a rural community while engaged in paid work opens up new horizons (Simpson et al., 2003).

Societal ties

Pundits have offered different opinions concerning the impact teleworking may have on societal ties. On one hand, an increase in telecommuting may result in a decrease in societal ties as individuals become more isolated from one another and from public institutions (Harpaz, 2002). The workplace serves as a stabilizing societal institution that anchors informal interaction outside of the workplace (Potter, 2003). Telecommuting may individualize society to a great extent, contributing to a breakdown in social norms. On the other hand, stronger ties to family and neighbors may replace workplace ties. Futurists have predicted the end of the traditional city and a rebirth of family-centered communities. For

instance, in his book *The Third Wave*, Toffler (1980) predicted that an information-based production system would move millions of workers out of factories and offices and back into the home.

Examples of Telecommuting Legislation and Policies

Telecommuting legislation

The value of telecommuting has been noticed on a national level. In the United States, the Telework Enhancement Act of 2010 requires all federal executive agencies to establish a policy under which eligible employees are allowed to telework. Under the law, a written agreement between the employee and agency manager is required that outlines the specifics of the telecommuting arrangement. On the agency level, the law directs each agency to designate a telework managing officer, who is responsible for policy development and the implementation of a teleworking program designed to "maximize" use of the policy, and requires that agencies offer an interactive telecommuting training program for all telecommuters and their managers (http://www.gpo.gov/fdsys/pkg/BILLS-111hr1722enr/pdf/BILLS-111hr1722enr.pdf). Interpretations of the legislation state that it is at the discretion of each individual agency to determine eligibility standards.

The stated goals of the program are to aid in the recruitment and retention of talent; to improve the ability of the government to operate during security incidents, national disasters, or other emergencies; and to help employees better manage work and family roles (http://www.telework.gov/Telework_Enhancement_Act/). While the impact of the telecommuting initiative on longer-term outcomes has yet to be measured, a report produced by the Office of Personnel Management provides insight on the impact of the legislation on telecommuting use (U.S. Office of Personnel Management, 2013). Telecommuting use increased from 2011 to 2012, although participation rates were still modest at 8% and 10% of all federal employees, respectively. The number of employees deemed eligible to participate increased more substantially, from 31.6% in 2011 to 47.3% in 2012. Thus, the legislation does seem to have had an impact on telecommuting in the federal workforce, but there is considerable room for improvement.

Lawmakers have put forth additional bills aimed at increasing the prevalence of telecommuting. Many of these have died in committee (e.g., H.R. 3080: Parents' Tax Relief Act of 2005, H.R. 4468: Enhancing America's Guard and Reserve Act), but one bill with direct relevance is still active as of this writing. The Multi-State Worker Tax Fairness Act (H.R. 4085/S. 2347) was sent to congressional committee in early 2014. This bill eliminates a double-taxation burden that telecommuters who live and work in different states may incur. Specifically, some states currently maintain the "convenience of the employer" rule, which requires that taxes be paid to the employer's state based on the employee's entire salary, not just the work done when he or she is physically present in that state. The rule also requires that taxes be paid to the home state on the part earned when telecommuting, resulting in double taxation. The intended result of the law is to reduce tax burdens and associated complications for payroll departments who currently must deal with complex tax withholding for multistate workers.

Beyond federal legislation, a few states have statutes or executive orders related to telecommuting. As of 2014, 16 states (Arizona, California, Colorado, Connecticut, Florida, Georgia, Minnesota, Maine, Maryland, New Mexico, North Carolina, Oregon, Rhode Island, South Carolina, Virginia, Washington) have statutes or executive orders encouraging telecommuting for state-agency employees. Additional states have telecommuting policies within various state departments that are not based on legislation but are nonetheless intended to increase the use of remote work. Finally, a few states, including Georgia, Hawaii, Minnesota, Oregon, Texas, and Virginia, offer tax incentives for agencies based on their percentage of telecommuters or for telecommuting conversion costs.

Telecommuting policies and procedures

As with all organizational phenomena, telecommuting policies and procedures vary across organizations in terms of allowable practices and specificity. However, case studies, government policies, and research-based best-practice recommendations shed some light on common practices. The first issue of consideration is whether or not to adopt a formal telecommuting policy. Many companies (e.g., Booz Allen Hamilton, Cisco Systems, Sun Microsystems) cite bottom-line reasons for offering telecommuting, such as cost savings on office space and energy and attraction and retention of desirable workers (T. Brennan, 2007; Jackson, 2008; U.S. Environmental Protection Agency Office of Air and Radiation, 2005).

Beyond case studies of specific organizations, only two known studies have empirically examined factors that relate to telecommuting adoption decisions on the firm level. Karnowski and White (2002) examined specific motivations of organizations to adopt or not adopt telecommuting. Among 87 organizations with telecommuting policies, they found that the top decision factors were that telecommuting "responds to human resource-related needs," "improves productivity or quality,"

"improves central office space," and "is compatibility with company growth or shrinkage." Moreover, 92% of organizations said that they had initiated the telecommuting policy to meet the needs of particular employees. Regarding motivations to not adopt telecommuting policies, 52% of the 464 nontelecommuting organizations included in the study indicated that the job types were not suitable to remote work, 34% expressed concerns about the management of telecommuters, 19% cited administrative difficulties, and 16% reported security or liability reasons. Given that this data is now relatively dated in light of rapid shifts in technology, it is unclear to which extent these motivations are contemporarily relevant.

Pérez-Pérez, Sánchez, de Luis Carnicer, and Vela Jiménez (2005) examined resource-based predictors of 479 Spanish firms' adoption (or lack of adoption) of telecommuting policies. With regard to human resources, they found that organizations with a higher percentage of knowledge workers (e.g., software programmers, designers, researchers) and salespeople were more likely to adopt telecommuting polices than those with fewer workers of this nature. Not surprisingly, organizations with and without teleworking policies also differed in terms of technological resources. Those who had adopted telecommuting offered significantly more training related to information and communication technologies to employees across levels of the organization; indicated a greater use of a wide variety of information and communication technologies; and invested more in research and development, new technology, and other forms of innovation. Finally, in terms of organizational resources, teleworking firms outsource more, have greater employee involvement in job design, and have a wider geographical market than firms without teleworking policies. Also using a sample of Spanish organizations, Mayo, Pastor, Gomez-Mejia, and Cruz (2009) examined organizational characteristics as predictors of teleworking adoption. They found that being in a service sector and having a larger percentage of international employees increased firms' likelihood of adopting telecommuting, whereas firm size was negatively related to adoption.

Once a formal policy is implemented, it is recommended that clear criteria be established for determining telecommuting eligibility. Often, supervisors serve as the decision makers (Lautsch et al., 2009). Lautsch and Kossek (2011) described common supervisor considerations in making teleworking decisions. Work-related considerations, which focus on whether the job can actually be accomplished remotely without face-to-face interaction, seem to be the most important. These decisions are often difficult and can be subjective, particularly in organizations that have deeply engrained face-time-oriented cultures (Shockley & Allen, 2010). Other manager considerations are related to technology (i.e., does the employee have the necessary technology at a home office to complete the work?) and personal and household characteristics (i.e., the employee's ability to work independently and whether children or other dependents will be present in the work space). Lautsch and Kossek (2011) also advised supervisors to allow all employees, whether they desire to telecommute or not, to offer input into determining telecommuting criteria as a means to enhance fairness perceptions.

Numerous researchers (e.g., Allen, 2001; Golden & Veiga, 2008; Thompson et al., 1999) and firms (e.g., Grensing-Pophal, 1998) have highlighted the critical role of supervisor support in the success of a telecommuting policy. Several practices have also been highlighted by researchers and by organizations as ways to cultivate such support. Clear expression of top management's support of telework has a trickle-down effect on managers at lower levels and demonstrates that telecommuting is viewed as a strategic goal within the broader company (B. Harrington & James, 2006). For example, Booz Allen Hamilton garnered support from their executive team by creating a proposal that listed the strategic outcomes of the program and benchmarking data from other similar companies (Jackson, 2008). Other companies (e.g., AstraZeneca, LexisNexis) provide in-depth training to both telecommuters and their managers, with the latter focusing on how to manage remote workers (U.S. Environment Protection Agency Office of Air and Radiation, 2005). As noted above, offering such training programs is a requirement within the Telework Enhancement Act, and several states have also embedded this within their legislation.

Monitoring and evaluation of employees is another important component of telecommuting programs (Lautsch & Kossek, 2011). This process is facilitated if a formal contract is established in which the conditions of the policy are outlined (e.g., number of days per week telecommuting is allowed, whether telecommuters must work during core hours, whether telecommuters must attend certain work functions in person, etc.) and specific criteria for performance evaluation are stated. KPMG, for example, requires that at least one of the following success metrics be included in the contract as a means to evaluate telecommuter performance: work volume/productivity, telecommuter satisfaction, client satisfaction, coworker/team satisfaction, effect on coworkers or team, work quality, work-process redesign, senior-management perception/buy-in, individual and/or team performance, chargeability, attendance/punctuality, morale/loyalty, turnover/retention, recruitment (attraction), public relations, and career development (Piersol, 2006). The contract should also state conditions under which telework arrangements will be terminated (i.e., failure to meet performance standards).

Moreover, in terms of actual supervisor monitoring practices, research suggests that managers should do their best to treat telecommuters and nontelecommuters in the same manner (Lautsch et al., 2009). In particular, supervisors should aim to communicate as frequently with telecommuters as they do with office workers. This relates to better organizational outcomes and helps reduce feelings of professional isolation among telecommuters (Greer & Payne, 2014; Golden et al., 2008; Lautsch et al., 2009; Van Dyne, Kossek, & Lobel, 2007).

Implications and Recommendations for Telecommuting Research and Practice

The advent of new ways of working and the growing desire for flexibility underscores our need to continue to understand the impact of telecommuting. In the following sections, we offer implications for practice and public policy and close with suggestions for future research.

Implications for practice and public policy

As indicated in our review, the complex and multifaceted literature concerning telecommuting cuts across multiple areas of study and has implications for a variety of stakeholders. Based on our review, we offer several conclusions regarding the state of the literature.

Extent of telecommuting matters. As we detailed throughout this article, there is an impressive array of evidence that the extent to which an individual works away from a central office makes a difference in determining outcomes. Although telecommuting has often been studied as a dichotomous variable, it is rarely an all-or-nothing practice. As noted by Golden and Veiga (2005), there may be a crucial threshold in the amount of time an individual can telecommute, beyond which there are diminishing returns. The research overall suggests that telecommuting may be most beneficial in terms of organizational outcomes when it is practiced to a moderate degree. That is, a balance of face-to-face and virtual contact may be optimal. In work that involves projects with certain lifecycles, face-to-face interaction may be particularly important during the projects' early phases (Coenen & Kok, 2014).

Trade-offs should be acknowledged and considered. The multivariate impact of telecommuting is complex, with the potential for simultaneous benefits and drawbacks. Organizations and policymakers must weigh the desire of individuals to work more flexibly while also keeping in mind the benefits of face-to-face communication for knowledge sharing and innovation (Coenen & Kok, 2014). Telecommuting may be beneficial for some outcomes but detrimental to others. For example, telecommuting may increase individual employees' productivity but hamper the development and maintenance of coworker relationship quality. Also, efforts aimed at reducing automobile emissions by encouraging organizations to implement telecommuting programs may be offset by an increase in household energy usage (Kitou & Horvath, 2003).

A multifaceted approach is needed. The success of any telecommuting program will depend on aspects of the person (e.g., self-regulation skills), the job (e.g., degree of task interdependence), and the organization (e.g., support from supervisors). For example, the extent to which the job is interdependent and depends on collaboration with others is an important consideration. "External-facing" jobs (e.g., sales) may be well suited for extensive telecommuting, while those that require close collaboration internally with others may be less so. Telecommuters should be provided with quality technology, and social richness can be incorporated into communication mechanisms to reduce social isolation. It cannot be assumed that every individual has the skills or the self-efficacy needed to effectively telecommute (Raghuram, Wiesenfeld, & Garud, 2003). Support and training from supervisors can facilitate the adjustment to a telecommuting work arrangement (Montreuil & Lippel, 2003).

Public policy can play a role in using telework as a tool to expand opportunities. As noted above, the Equal Employment Opportunity Commission recognized telework as a reasonable accommodation under the ADA. Public policy can be used to facilitate work opportunities for those with disabilities and increase the civil rights of disabled workers (P. M. A. Baker et al., 2006). In addition, the ability to telecommute can be a key source of support for the parents of children with special needs (E. M. Brennan, Rosenzweig, Jivanjee, & Stewart, in press). Individuals with disabilities and those associated with them (e.g., parents) often face stigmatization (E. M. Brennan et al., in press). Moreover, those who seek flexible work options may also be stigmatized (Vandello, Hettinger, Bosson, & Siddiqi, 2013). The normalization of telecommuting through policy and practice can help reduce such stigmas.

Future research

The ability to make sound policy recommendations regarding telecommuting is dependent on the quality and scope of the data gathered. Below, we offer suggestions for researchers intended to improve the quality of the data on telecommuting as well as identify areas of research in need of development.

Contextual information. In order to better understand when telecommuting is most effective, more comprehensive information concerning the nature of the telecommuting and the context is needed in research studies (Feldman & Gainey, 1997). First, it is important to provide a clear definition of telecommuting to participants so that comparisons across studies can be more readily made. For example, researchers should clearly specify if the telecommuters work part of their time out of their home, as we suggested in our definition above, or if another type of work arrangement is considered. Second, the frequency or extent of telecommuting should be precisely distinguished. For example, capturing the hours per week or the percentage of time that someone telecommutes provides more information than does dichotomizing individuals into low- or high-frequency telecommuting groups. Third, to better isolate the effects of telecommuting, temporal flexibility should also be taken into account. Without information on temporal flexibility, researchers are less able to know if positive work-related outcomes are due to telecommuting or to the individual's being able to modify the timing with which work is completed. Fourth, it is important to provide organizational context and reasons for telecommuting, such as whether or not the telecommuting is by employee choice. For example, in some cases, telecommuting may be required of employees as part of a larger organizational initiative, while in other cases, an employee may initiate a telecommuting work arrangement. Contextual information concerning the type of work and the culture of the organization in terms of family supportiveness or the percentage of employees who do telecommute can help illuminate the boundary conditions of research results. It would be useful for researchers to assess all of these characteristics in their studies.

The role of time. The majority of existing telework research, particularly as it pertains to workplace issues, is based on cross-sectional research designs. This limits our knowledge of causality, but it also limits our knowledge concerning the role of time. To address these limitations, longitudinal methodologies that cover both shorter and longer time frames are needed. Shorter time periods such as those common in experience-sampling studies permit the capture of rapid, potentially reversible change, while studies conducted over longer periods are also needed to identify slower developmental processes that are less easily reversed. These studies are needed to shed a brighter light on directionality but can also help determine if telecommuting is a "sustainable" practice or is more episodic in occurrence (e.g., individuals telecommute for a period of time and then drop out or drop in and out; Varma, Ho, Stanek, & Mokhtarian, 1998). That is, under what specified periods of time do the benefits of telecommuting accrue or begin to decline? What period of time is needed for individuals to adjust to a telecommuting arrangement? Do the potential pitfalls of telecommuting, such as the deterioration of work relationships or career stalemates, begin to reveal themselves quickly or only over a longer period of time? What are the effects when telecommuting is paired with family issues, such as when an employee requests to telecommute for a period of time following childbirth?

Health considerations. There has been surprisingly little research investigating links between telecommuting and health-related behaviors and outcomes. Several topics appear particularly worthy of attention. One consideration is the ergonomics of the telecommuter's workstation. In corporate offices, risks for employee injury are commonly controlled through the setup of ergonomically designed computer workstations, regulated rest breaks, engineered lighting, and inspections by safety officers (S. S. Harrington & Walker, 2004). These same risk controls are not typically in place in home offices, which are commonly set up by telecommuters without employer guidance, seemingly increasing the risk for injury (Ellison, 2012). Chairs that lack proper lumbar support, improper monitor and keyboard height, mouse position, no or hard armrests, and reliance on laptop keyboards can all contribute to musculoskeletal disorders (Dennerlein & Johnson, 2006; Ellison, 2012; Garza, Catalano, Katz, Huysmans, & Dennerlein, 2012).

Another topic is the impact of telecommuting on physical activity. This issue is important in that the health risks associated with extended periods of time spent sitting—such as excess weight gain, cardiovascular disease, diabetes, and premature mortality—are becoming increasingly well known (Thorp, Owen, Neuhaus, & Dunstan, 2011). On one hand, working from home may decrease total body movement, as individuals are not required to travel to an offsite location or move around an office environment. On the other hand, the time saved by not telecommuting could be put toward workers' physical-activity routines, such as going to the health club. Moreover, some research has indicated that long commutes contribute to poor health outcomes. Specifically, commuting distance has been negatively associated with physical activity and cardiorespiratory fitness (Hoehner, Barlow, Allen, & Schootman, 2012). One intervention that is currently receiving attention to help address the problem of long hours spent sitting in front of a computer is the installation of sit-stand workstations, which have been found to reduce sitting time at work by 21% and to increase employees' overall sense of well-being and energy (Dutta, Koepp, Stovitz, Levine, & Pereira, 2014). Overall, more research is needed to

understand the connections among work location, physical activity, and health outcomes.

A final consideration is the impact on dietary choices. Working from home may be associated with more healthful dietary choices. Healthy food options are often missing from the workplace, where vending machines are filled with high-calorie, low-nutrition foods. At least one study has found that individuals who reported having greater flexibility in terms of their work location also reported eating less fast food for dinner (Allen, Shockley, & Poteat, 2008). In sum, research investigating both the potential positive and negative health links with telecommuting is needed.

Conclusion

Telecommuting has received enormous attention from researchers and the public because of its potential for widespread benefits at individual, organizational, and societal levels. However, there are potential drawbacks as well. This article provides a critical synthesis of the telecommuting literature. Telecommuting arrangements bring to the forefront the notion that work is no longer a place but what you do, and new ways of working are likely to continue. A multidisciplinary, comprehensive understanding of both the benefits and the drawbacks of telecommuting can be used to more effectively shape and inform organizational practices and public policy.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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