

A review of telework research: findings, new directions, and lessons for the study of modern work

DIANE E. BAILEY^{1*} AND NANCY B. KURLAND²

¹*Center for Work, Technology and Organization, Department of Management Science and Engineering, Stanford University, U.S.A.*

²*16802 Calle de Sarah, Pacific Palisades, CA 90272, U.S.A.*

Summary

Telework has inspired research in disciplines ranging from transportation and urban planning to ethics, law, sociology, and organizational studies. In our review of this literature, we seek answers to three questions: who participates in telework, why they do, and what happens when they do? Who teleworks remains elusive, but research suggests that male professionals and female clerical workers predominate. Notably, work-related factors like managers' willingness are most predictive of which employees will telework. Employees' motivations for teleworking are also unclear, as commonly perceived reasons such as commute reduction and family obligations do not appear instrumental. On the firms' side, managers' reluctance, forged by concerns about cost and control and bolstered by little perceived need, inhibits the creation of telework programmes. As for outcomes, little clear evidence exists that telework increases job satisfaction and productivity, as it is often asserted to do. We suggest three steps for future research may provide richer insights: consider group and organizational level impacts to understand who telework affects, reconsider why people telework, and emphasize theory-building and links to existing organizational theories. We conclude with lessons learned from the telework literature that may be relevant to research on new work forms and workplaces. Copyright © 2002 John Wiley & Sons, Ltd.

Introduction

In the quarter century since Nilles first coined the term 'telecommuting' (Nilles, 1975), the practice of telecommuting, or alternatively telework, has been heralded as a cure for a variety of organizational and social ills. It has been lauded as a strategy to help organizations decrease real-estate costs (e.g., Egan, 1997), respond to employees' needs for a healthy work–family balance (e.g., Shamir &

* Correspondence to: Diane E. Bailey, Center for Work, Technology and Organization, Department of Management Science and Engineering, Stanford University, Stanford, CA 94305-4026, U.S.A. E-mail: Diane.Bailey@stanford.edu

Contract grant/sponsor: National Science Foundation.
Contract grant/number: DMI-9996081.

Salomon, 1985), and aid compliance with the 1990 Americans with Disabilities Act (e.g., Matthes, 1992). Telework also has been promoted as a way to reduce air pollution and traffic congestion (e.g., Handy & Mokhtarian, 1995; Novaco, Kliewer, & Broquet, 1991). By the end of the last century, 11.5 million people in the U.S. were teleworking (Cyber Dialogue Inc., 2000).

In many respects, telework is emblematic of recent changes in our ideas of work and the workplace. Defined as working outside the conventional workplace and communicating with it by way of telecommunications or computer-based technology (Nilles, 1994; Olson & Primps, 1984), telework constitutes an early form of virtual work. Long before cellular phones, laptop computers, and other wireless devices transformed hotels and airport lounges into workspaces for a force of mobile employees, teleworkers were completing work away from the office. In the process, they redefined our images of how and where work can be performed, and caused managers to reexamine how they evaluate performance and supervise employees. Additionally, telework presaged changes in the labour contract between employees and firms. Clerical workers, in some of the first telework programmes, reported a loss in benefits and corporate affiliation that mirror what legions of contract workers face today. In this paper, we review nearly two decades of telework research, highlighting what has been learned and what has not and drawing lessons for the study of modern work.

In our review, we discover that many studies carry implicit and explicit assumptions about teleworkers and the practice of telework. These assumptions influence which research questions scholars address. They also shape the design of studies and funnel attention to certain data over others. Teleworker statistics, however, indicate that employees work away from the office in ways that often run counter to these assumptions. For example, individual teleworkers constitute the nearly universal focus of existing studies. Yet, because employees who telework tend to do so infrequently (typically only a few days per month), it seems unlikely that their primary organizational identity is 'teleworker.' Consequently, pursuing investigations of teleworkers *per se* stands to yield fewer useful insights than would studying the practice of telework more broadly. Thus, rather than examining outcomes like social isolation among individuals who actually are not absent from the office all that often, researchers instead might use telework as a setting for grounded investigations of the pressures that office work exerts on employees and that cause them at times to seek escape via remote work.

We identify several such assumptions that arise in the research on telework. We urge future studies to expand the research lens beyond individual teleworkers, and to rethink employees' motivations for working away from the office. We also highlight recent theory-building efforts, and encourage greater links between telework research and existing organizational theories. Overall, we consider the implications of telework research and its findings for the study of new work forms and workplaces.

1. Review of Telework Research

Our search for telework literature yielded more than 80 published academic empirical studies, which emerge from disciplines ranging from transportation research, urban planning, and information science to organizational behavior, ethics, law, and sociology.¹ We focus on these studies rather than the numerous technical reports, conference proceedings, and practitioner articles on telework because we wish to examine findings that are widely available, peer-reviewed, and based on data. We also consider ideas from over 50 other academic studies on telework. These studies are primarily essays, with

¹A table describing the samples and summarizing the primary findings of the studies is available from the first author.

topics that include the future of telecommuting (e.g., Handy & Mokhtarian, 1996), methodological issues (e.g., Kraut, 1989; Mokhtarian, Handy, & Salomon, 1995; Mokhtarian, 1991), legal and union issues (e.g., Smith & Baruch, 2001; Broder, 1996; DiMartino & Wirth, 1990), gender issues (e.g., Holcomb, 1991; Huws, 1991), and considerations of time and space (e.g., Perin, 1998).

Several other reviews of the telework literature have been written. Haddon and Lewis (1994) review much of the European work, emphasizing teleworker concerns. Pinsonneault and Boisvert (2001), in a review of practitioner and academic articles, consider both negative and positive impacts for teleworkers, as well as implications for managers. The focus of these two reviews matches that of much of the empirical research, which seeks to identify telework's major benefits and disadvantages. Schedule flexibility, freedom from interruptions, and time saved in commuting often emerge as benefits, while professional and social isolation are among the factors cited as drawbacks (e.g., Baruch & Nicholson, 1997; Crossan & Burton, 1993; DeSanctis, 1984; Turban & Wang, 1995). Attention to telework's advantages and disadvantages is quite prevalent among the early studies, but lists appear in recent work as well (e.g., Baruch, 2000; Teo, Lim, & Har, 1999). As the contents of the lists have not changed much over time, the later publication of such work may simply reflect a resurgence of interest in the telework phenomenon. McCloskey and Igarria (1998) review 32 practitioner and academic articles, concluding that existing literature is hampered by definitional problems, methodological weaknesses (e.g., small sample sizes), and a lack of control of important variables. While some of these problems persist across our larger sample, we note that rigour is improving. We uncover other obstacles, however, that prove troublesome for the study of telework.

In our review of this literature, we look beyond an enumeration of the advantages and disadvantages of the practice of telework. We seek instead the answers to three questions central to explaining any observed organizational phenomenon, and particularly relevant to emerging work forms: who participates in it, why, and what happens when they do? These questions are present, either implicitly or explicitly, in much of the telework research that has been conducted. Yet, we conclude from our review that they remain largely unanswered. We examine the literature to uncover why these questions are difficult to answer.

Who teleworks?

Establishing who teleworks has never been easy. Teleworkers often work as contractors rather than full-fledged employees, so they are difficult to count. Moreover, estimates of the teleworking population's size vary for methodological reasons like sampling technique and the definition of teleworker employed (Kraut, 1989). Most informative, then, are repeated estimates over time from the same source. Cyber Dialogue's (2000) 1999 figure of 11.5 million U.S. teleworkers represents an increase of less than 1 per cent over the firm's 1998 estimates. As reported by the International Telework Association and Council (2000), the Cyber Dialogue data reflect a teleworker gender distribution of 51 per cent women and 49 per cent men. The typical U.S. teleworker is about 42 years old and has a median household income of U.S. \$45 200. These demographic figures differ only slightly from those the consulting firm LINK Resources (U.S. Department of Transportation, 1993) reports in a study completed more than five years earlier, and are consistent with those found in a large San Diego sample (Mannering & Mokhtarian, 1995; Mokhtarian & Salomon, 1996a, 1996b).

This demographic picture differs in striking ways, however, with those of several other large academic studies. In a State of California pilot project with 163 teleworking participants, 65 per cent were male and most were mid-level professionals (Olszewski & Mokhtarian, 1994). Demographic data from this U.S. study concur with a large phone survey of Finnish workers, which finds telecommuters to be primarily high income, highly educated, male, independent professionals (Luukinen, 1996).

Differences in teleworker demographics may simply reflect differences in occupation, perhaps along clerical worker/professional lines. In the Cyber Dialogue survey, full-time employees who teleworked were more likely to be male (57 per cent), slightly younger, and earn more (\$49 500), while part-time employees who teleworked informally were more likely to be female (almost 75 per cent), somewhat older, and earn less (\$34 500). Given the difficulties in surveying teleworkers, obtaining a definitive answer to the question of who teleworks may prove impossible.

Numerous scholars have attempted instead to identify: (1) the traits of employees who could telework if they so desired; and (2) the factors that predict who will telework. Job suitability reigns high among traits considered indicative of which employees are eligible for telework. Writers have compiled lists of necessary telework task and job characteristics (e.g., Baruch & Nicholson, 1997; Olson, 1983). Individual control of work pace and little need for face-to-face interaction are examples of suitable job traits. Knowledge workers, information workers, and sales and marketing personnel, because their jobs often display these characteristics, are considered prime candidates for telework (U.S. Department of Transportation, 1993). Such global measures of job suitability, however, may grossly exaggerate the number of people whose work lends itself to remote performance. We briefly explain why here; a more complete discussion can be found in Mokhtarian (1998).

Recent research has shown that idiosyncratic details of individual jobs, not general job traits, are more likely to determine whether a specific individual can telework (Mokhtarian, 1998). Among a sample of 628 City of San Diego employees, many of whom are information workers and thus presumably ideal telework candidates, Mokhtarian and Salomon (1996a, 1996b, 1997) find that employees' self-perceived job unsuitability significantly constrains their choice to telework. Based on firsthand knowledge of what their work entails, individuals choose not to telework because they think their job cannot be performed well away from the office. In short, perceptions of job suitability based on intimate knowledge of specific jobs, rather than global job categories, may better predict who can telework.

Moreover, consideration of such factors as job suitability often masks issues of status and power that are densely intertwined with occupation. These issues appear, for example, in the comparison of professional and clerical positions. Although both types of positions are deemed suitable for telework based on an assessment of general job characteristics, several studies indicate that clerical workers may face greater opposition from management to their requests to work at home (e.g., Huws, Korte, & Robinson, 1990; Mokhtarian, Bagley, & Salomon, 1998; Olson & Primps, 1984; Tomaskovic-Devey & Risman, 1993). Additionally, employers may make telework more attractive for professionals than for clerical workers. Olson and Primps (1984) report that clerical workers lost full-time permanent status, medical benefits, and vacation when they converted to telework, and their already low autonomy became further restricted. Professionals in that study, by contrast, were offered teleworking arrangements more in line with a job enrichment perspective, such that their autonomy, already high, expanded by working at home. Thus, status and power may interfere with assessments of who can telework based solely on perceptions of job suitability.

Efforts to determine which factors are predictive of who will telework have spawned considerable model-building efforts within the transportation literature. Models by Mokhtarian and her colleagues (Mannering & Mokhtarian, 1995; Mokhtarian & Salomon, 1996b, 1997), based on samples of more than 500 workers in public agencies, reflect that work-related factors are most predictive of an individual's choice to work remotely, a finding that is significant for organizational researchers. These factors include manager's willingness, workplace interaction, and self-perceived job suitability. Additionally, a number of personal and household attributes appear predictive, including lack of personal discipline, household distractions, preference to work with a team, family orientation, and workaholicism. Technology factors (e.g., computer availability) also appear in some models in this series. No other category seems to be as predictive, however, as are work factors.

To summarize, although clear teleworker demographics continue to elude researchers, research to date suggests that the teleworking population may be divided along occupational and gender lines, with a predominantly male professional segment and a largely female clerical segment. Predictions of which employees presumably could telework exaggerate the teleworking population when based on calculations of job suitability, which gloss over issues of status and power. Finally, work-related factors like manager's willingness appear most predictive of which employees actually will telework.

Why do individuals telework?

Researchers often capture demographic data in an attempt to answer typically unspoken questions related to employees' motivations for telework: Do women choose to telework so that they might work and provide childcare simultaneously? Do people telework primarily to avoid long commutes to the office? From the firm's side, inducements to offer telework to employees are thought to include lower real-estate and overhead costs (through hotelling arrangements or equipping employees in their homes), compliance with federal regulations such as the 1990 Americans with Disabilities Act (by providing employment for homebound individuals), and the facility to reduce labour costs by hiring contract labour (who may be hired with limited or no benefits). The historical conceptualization of telework, as illustrated in Figure 1, thus includes both supply (employer) forces that serve to push employees out of the office and demand (employee) forces that draw them into the alternate workplace, typically the home.

The literature to date has investigated demand forces more thoroughly than supply ones. Telework came into vogue in the 1970s as an oil crisis gave rise to concerns over gasoline consumption, long work commutes, and traffic congestion in major metropolitan areas. Rather naturally, investigations into the motivation for telework have centred on transportation-related factors, such as the time to commute, the length of the commute, and commute-induced stress. Yet, travel reduction, especially in the form of commute travel, has not proved to be the strong motivator for telework that early forecasters surmised. Neither the time to commute nor the distance of the commute is predictive in several large-scale models of (1) the preference of employees to telework rather than work in the office (Mokhtarian & Salomon, 1997; Stanek & Mokhtarian, 1998) or (2) the frequency of actual telework (Mannering & Mokhtarian, 1995; Olszewski & Mokhtarian, 1994). A few studies do indicate that workers who telework have longer commutes than those who do not (Baruch & Nicholson, 1997; Olszewski & Mokhtarian, 1994). But overall, commute factors do not appear to be the primary motives for telework, and in many cases are absent altogether. (See Salomon, 1985, for a discussion of travel motivations.) As a whole, transportation studies of telework indicate that travel reduction is not a major inducement for telework.

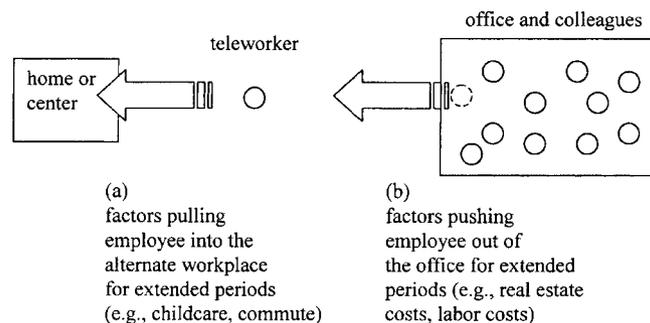


Figure 1. Historical conceptualization of telework

A second suspected motivation for telework is the ability to balance work and family duties, in particular among women with small children at home. Indeed, women are more likely to list family benefits as a motivation for telework than are men (Mokhtarian *et al.*, 1998). Yap and Tng (1990) target what they consider the most likely group of prospective teleworkers in Singapore: female computer professionals. Among the 459 women in their sample, nearly 75 per cent favour telework, citing time to take care of family as a major benefit. Likewise, Huws *et al.* (1990) find interest in telework to be strong among families with more than four people in the household (e.g., three or more children). A few studies indicate that telework aids employees in balancing work and family responsibilities, particularly among dual-career couples (e.g., Duxbury, Higgins, & Neufeld, 1998). In addition, women are prominent in certain restricted samples of teleworkers (e.g., Gerson & Kraut's (1988) clerical worker sample).

Overall, however, women do not dominate teleworking populations. Large studies indicate either that the population is nearly split between men and women (Cyber Dialogue, as reported in International Telework Association and Council, 2000; Mannering & Mokhtarian, 1995; Mokhtarian & Salomon, 1996a, 1996b, 1997; U.S. Department of Transportation, 1993) or that many more men than women telework (Luukinen, 1996; Olszewski & Mokhtarian, 1994). Moreover, Huws *et al.* (1990) find interest in telework to be stronger among couples with no children than among couples with one to two children. Kinsman (1987) reports that teleworkers with small children find it difficult to balance child-rearing with work. Evidence to date thus undermines the hypothesis that family concerns will drive women to telework.

With the two major perceived inducements for telework at the individual level largely ruled out, little else remains among formal enquiries to explain why individuals choose to telework. We can glean limited information from a survey of 4000 European employees that Huws *et al.* (1990) polled. Fourteen per cent of that population expresses interest in telework; this interest is positively related to the respondents' familiarity with new technologies and negatively related to their age. Corresponding large-scale surveys of employee interest in the U.S. do not exist.

Research on the supply side motivation is far more limited. Most studies in this realm attempt to uncover why adoption and diffusion of telework has been slow among firms. The main finding is that interest among managers is low. Huws and her colleagues (1990, p. 173) complement their survey of employees with a poll of 4000 European managers, concluding that telework 'is still very much a minority interest' among European managers. Managers give two major reasons for lack of interest in telework: they see no need for the change, and coordinating such programmes is difficult. Managers in large firms express concerns about controlling workers who work away from the office. For smaller firms, anticipated costs of implementing and managing telework programmes are a greater managerial issue.

Among studies with U.S. samples, scholars have investigated issues of trust and control. Management's trust of employees, or lack thereof, appears to shape a firm's decision to adopt telework (Harrington & Ruppel, 1999). Trust also may influence which employees in a firm can telework. Tomaskovic-Devey and Risman (1993), in a study of 114 chief decision-makers in North Carolina firms, report that managers who fear loss of control are more likely to favour telework programmes for professionals than for clerical workers. In fact, firms with large clerical workforces are less likely to adopt telework (Tomaskovic-Devey & Risman, 1993).

Firm size is a final factor that researchers have examined with regard to telework adoption and diffusion, with mixed results. Huws *et al.* (1990) find telework more appealing to managers in large firms than those in small firms, while other studies indicate the reverse (Tomaskovic-Devey & Risman, 1993; Zamindar, 1996). About half the full-time teleworkers employed by organizations in 1998 were in firms with less than 100 employees; only about one-quarter worked for large firms of 1000 employees or more (Cyber Dialogue, as reported in International Telework Association and Council, 2000).

Bureau of Labor Statistics data for 1998 indicate that establishments with less than 100 employees employed 55 per cent of the overall working population, while 12 per cent worked in establishments with more than 1000 employees (Bureau of Labor Statistics, 1999).² These comparative figures suggest support may be weakest in mid-sized firms, and that future studies of the impact of firm size might do well to employ more finely grained categories. Overall, little motivation, coupled with concerns of cost or control, may stifle telework interest among managers in firms of all sizes.

In sum, expected motivations for individuals to pursue telework have not been borne out, leaving the question of why some employees opt to work remotely. Studies of managers suggest that their reluctance plays a role in predicting employers' adoption of telework. Further work is needed to resolve conflicting findings regarding the role of firm size in the adoption of telework.

What happens when people telework?

Positive outcomes such as improved productivity, organizational loyalty and belonging, job satisfaction, and employee retention and attraction often top lists of telework's advantages. (See Pinsonneault & Boisvert (2001) for a more complete recent listing of telework's potential positive and negative impacts.) Two outcomes in particular receive the most attention among the empirical studies we examined: productivity and job satisfaction.

In the case of productivity, stories of increased worker productivity among teleworkers are rampant in the practitioner press. For example, 87 per cent of employees in IBM's alternative workplace programme report that they believe their productivity and effectiveness have increased significantly (Apgar, 1998). The empirical articles we examined contain similar worker accounts of higher productivity when working at home (e.g., Bailyn, 1988; Baruch & Nicholson, 1997; Bélanger, 1999b; Frolick, Wilkes, & Urwiler, 1993; Kinsman, 1987; Hartman, Stoner, & Arora, 1992; Manning, 1985; Olson, 1982; Pratt, 1984; Shirley, 1985). In fact, only one study notes a decrease in productivity (Phelps, 1985), but this initial drop was followed later by higher productivity.

Yet, with few exceptions (e.g., DuBrin, 1991; Geisler, 1985), accounts of increased productivity under telework are derived from self-report data. Because most teleworkers volunteer or request to work at home, they might be biased to claim success. Among 62 teleworkers Baruch and Nicholson (1997) interviewed, 75 per cent said they are more or much more effective at home than in the office, a percentage about equal to those who volunteered to work at home. In that sample, 48 per cent of teleworkers report increased hours when working at home, which raises the possibility that the teleworkers may be conflating improved productivity with an increase in the absolute amount of work performed. Olson (1985) was the first to harbour this suspicion. In her *Datamation* survey, 67 per cent of the people who work at home report increased productivity; among them, 40 per cent report that they work too much. Self-report data, for a variety of reasons, fails to provide convincing support for productivity claims.

Similarly, there is little clear evidence of increased job satisfaction among teleworkers in the studies we examined. Although many studies investigate various forms of satisfaction specific to the teleworking arrangement (e.g., satisfaction with telecommuting, Hartman *et al.*, 1992; Ramsower, 1985), only a few studies measure general job satisfaction (e.g., Bailyn, 1989; Bélanger, 1999b; DuBrin, 1991; Norman, Collins, Conner, Martin, & Rance, 1995). With the exception of interview data suggesting that employees enjoy the freedom and flexibility of working at home (e.g., Crossan & Burton, 1993; Duxbury *et al.*, 1998; Hill, Hawkins, & Miller, 1996), the literature lacks support for claims of higher satisfaction among teleworkers.

²Establishments are different from firms in the BLS terminology, as one firm may have multiple establishments. Thus, the figures provide an approximate comparison only.

2. Why Questions of Who, Why, and What Happens Remain Difficult to Answer

Despite research in telework spanning nearly two decades, the three questions we posed (who teleworks, why, and what happens when they do?) remain largely unanswered. In part, as we have noted, challenges such as defining and locating the teleworking population hinder researchers' ability to answer these questions. Beyond methodological and definitional challenges, other factors also pose obstacles in telework research. The most striking of these factors concerns assumptions that researchers make.

The overlooked question: How do people telework?

Most previous research, and particularly work in organizational studies, has failed to ask how individuals practice telework. While organizational scholars often frame their studies in ways that suggest teleworkers work away from the office on a full-time basis, in reality, most teleworkers work at home or in telework centres only a few days per month (Korzeniowski, 1997; Piskurich, 1996; Weiss, 1994). In a sample of 563 employees drawn from three public agencies, only 11 individuals teleworked three or more days per week (Mannering & Mokhtarian, 1995). In their study of 163 professionals who telework, Olszewski and Mokhtarian (1994) report an average teleworking frequency of five to six days per month. While some firms may restrict the frequency with which employees telework (e.g., Kompast & Wagner, 1998), employees state preferences for part-time, not full-time, telework (e.g., Hamblin, 1995; Teo *et al.*, 1999; Yap & Tng, 1990). The image of employees working remotely on a full-time basis, while true for some individuals, does not accurately depict the teleworking population as a whole. Although this problem was first pointed out rather early on (see Ramsower, 1985), it appears to have gone unheeded in many subsequent studies.

Some prior work (e.g., McCloskey & Igbaria, 1998) notes the probable significant impact of teleworking frequency on outcomes. When we combine the possibility that frequency is a strong moderator with evidence that frequencies are low across the teleworking population, it becomes clear that a significant amount of attention has been funnelled to an inappropriate set of independent variables. For example, if we accept that most people who telework do so for only a few days each month, we are less likely to suspect that their motivation is to avoid a long commute or to take care of children, else they would work away from the office more often. (Notably, Olszewski, & Mokhtarian (1994) arrive at the same conclusion.) Similarly, we might not expect much change in individual level variables because workers are not away from the office frequently enough or for long enough periods. These variables include social and professional isolation, managerial control, employee evaluation and assessment, and loyalty to the firm, all of which have been cited as concerns in previous telework studies (e.g., Khan, Tung, & Turban, 1997; Mokhtarian *et al.*, 1998; Olson, 1982; Pratt, 1984; Yap & Tng, 1990).

Consider the example of isolation. If we assert that telework leads to social and professional isolation for teleworkers, as numerous authors do (e.g., Gainey, Kelley, & Hill, 1999; Metzger & Von Glinow, 1988; Salomon & Salomon, 1984), we might argue that they become invisible at the workplace, miss out on office gossip, are forgotten in the distribution of more formally constructed information, and receive poor evaluations. Over time, they become dissatisfied. They exit the firm, return to the office, or stay at home with high levels of dissatisfaction. If we now examine our argument in light of the predominant part-time practice of telework, we might suspect that frequency moderates the initial link between telework and isolation so strongly that it makes the balance of our prediction uninteresting. In other words, individual teleworkers are away from the office so infrequently that they

do not become invisible, miss out on gossip, or in any other way become isolated. This single fact alone may limit quite strongly what we can say about many individual level outcomes of telework.

Several studies in fact reveal the limited impact of telework in samples where it is practiced infrequently. Bélanger (1999a) finds that employees who telework part-time are not left out of the office network, nor does telework make a difference in determining which individuals communicate with each other. Office-based employees in her study do not form communication blocks that exclude teleworkers, although some blocks consist mostly or completely of teleworkers. With regard to this latter result, Bélanger surmises that teleworkers may be more comfortable communicating with one another. Similarly, Duxbury and Neufeld (1999) find that part-time telework has little impact on intra-organizational communication. Telework does not impact how often people communicate, how often they use various communication channels, the importance they place on different modes of communication, or the number of perceived communication problems. One exception they note is that telework may have a negative impact in those situations where managers and co-workers feel uncomfortable phoning teleworkers at home. These studies support our contention that part-time telework may yield few significant impacts.

Two other studies, however, suggest realms where infrequent telework may have effects. With the same sample as Duxbury and Neufeld (1999), Duxbury *et al.* (1998) show that, over time, teleworkers report less work and family conflict. By comparison, a control group, managers, and co-workers in that study report no changes in their levels of work and family conflict. Olszewski and Mokhtarian (1994) compare office-based state agency employees with teleworking colleagues who work away from the office only several days per month. They report that teleworkers interact with others significantly less, although their scores increase with time. Teleworkers also score higher in terms of the frequency with which they analyse information and make decisions. For the most part, however, the impact of frequency has been overlooked in prior work. We suspect that while there may be certain instances under which even part-time telework has an impact, overall, the frequency with which individuals telework may prove instrumental in dampening the impact of their absence from the office.

Other problematic assumptions

Two other assumptions, beyond that of full-time telework, appear in the literature. The first assumption concerns the range of telework's impact in the organization. To date, most studies on telework focus on the individual, primarily the teleworker, and occasionally the teleworker's supervisor or a non-teleworking colleague. Few studies have examined the impact of telework on the organization as a whole, or even on smaller work groups (for an exception, see Hill, Miller, Weiner, & Colihan, 1998). Certainly, some studies have considered cost savings and legal ramifications for organizations (e.g., DiMartino & Wirth, 1990; Raney, 1985; Shirley, 1985; Watad & DiSanzo, 2000; Westfall, 1998) and union rights (e.g., Broder, 1996; Horner & Day, 1995). Yet, interpersonal processes and outcomes at the workplace remain overlooked. As we will discuss, the impact of telework across the larger working population may be considerable.

That people who telework do so on a permanent basis constitutes another assumption in telework research. Few studies explicitly examine the length of teleworking arrangements (for an exception, see Varma, Ho, Stanek, & Mokhtarian, 1998). With the median job tenure in 2000 down to a record low of 3.5 years (Bureau of Labor Statistics, 2000), changes in job position or firm may diminish the attractiveness and availability of working away from the office. Additionally, for those individuals who do work at home in an effort to balance family with work, telework may be abandoned upon entry of the youngest child into school (Becker, 1986). The expected duration of a teleworking arrangement may moderate telework's impact for individual teleworkers, their families, and their work associates.

3. New Directions for Telework Research

We suggest three steps for future telework research in addition to overcoming the assumptions discussed above. First, scholars should expand the research lens beyond individual teleworkers. Doing so would shift attention from the question of who teleworks to the larger question of who the practice of telework affects. Second, given the reality of how people telework, scholars should reconsider why employees work away from the office. Under a new conceptualization, telework might come to be seen as one of many mechanisms individuals enact to cope with the demands of the modern workplace. Additionally, a new conceptualization of telework could prompt scholars to recognize potential outcomes overlooked in the current literature. Third, new studies should emphasize theory-building and forge links to existing organizational theories. Such efforts would be instrumental in sorting out what happens when people telework.

Expanding the research lens

We noted that most empirical studies to date have focused on individual teleworkers. Continued research centred on teleworkers may have limited value, in large part because many expected individual level outcomes may hinge upon the frequency with which one is absent from the office. Teleworker statistics strongly suggest that this frequency is in fact quite low for most people who telework. Yet, 11.5 million people are teleworking on occasion, and surely their doing so has organizational effects.

We suggest that to fully understand telework, scholars need to expand the research lens to include all parties who might be affected when an individual teleworks. When scholars consider the larger population of work groups, managers, support staff, vendors, clients, and others, theory-building efforts can more easily advance. From this perspective, one can see that at any point in time, a certain fraction of the workforce may be working remotely, albeit not the same individuals each day. Unlike models and theories aimed at individual teleworkers, models and theories focused on this larger population are not limited by the frequency with which any single employee teleworks. Moreover, issues like professional isolation among teleworkers diminish in importance. New issues take their place, such as frustration among employees remaining in the office who must contend with shifting patterns of interruptions, missing colleagues, and erratic workloads. Scholars can also examine the impact the practice of telework has on organizational meanings and forms of social conventions, organizational change, and interaction with national culture (for related ideas, see Rice & Gattiker, 2001). Overall, the research focus shifts from the individual to the work group, a network of individuals (e.g., customers, suppliers, and organizational members), the organization as a whole, or to distributed business systems networked together. Moreover, the set of independent variables of import changes, and the resultant hypotheses remain interesting even if individual frequencies of telework are low. The key lies in studying telework as a practice with a broad range of potential impacts rather than studying teleworkers as a class of employees.

Reconceptualizing telework

We limited our earlier discussion of individual motivation for telework to findings from explicit inquiries related to it. Buried in many other studies, however, were considerable data that provide what we think is a strong clue for why people work remotely. Consistent with the practice of part-time telework, these data indicate that employees often choose to work away from the office simply to avoid

interruptions (see, for example, Duxbury & Neufeld, 1999; Hartman *et al.*, 1992; Manning, 1985). This explanation suggests that telework most correctly should be viewed as a practice that individuals occasionally employ, not as a full-time work arrangement.

Despite the frequency with which employees raise the avoidance of interruptions as a reason for telework, no study has explicitly examined interruptions. Quite possibly, previous researchers viewed the avoidance of interruptions as a secondary, albeit fortuitous, advantage of telework. When we accept it instead as a primary motivation, our conceptualization of telework shifts away from the traditional one of supply and demand forces aimed at long-term work outside the office to a more dynamic image, in which various individuals at different times may work away from the office for short periods of time. Their motivations for avoiding interruptions may include needing to meet impending deadlines or seeking quiet time for tasks that require considerable thought.

Accepting avoidance of interruptions as a primary motivation for telework at the individual level is a good start. To end there, however, leads to the possibly false conclusion that telework enhances productivity. That outcome seems less certain when we consider that interruptions may constitute much needed opportunities for spurring creativity and knowledge transfer (Hall & Richter, 1990; Kraut, Fish, Root, & Chalfonte, 1990). In these instances, reducing the occurrence of interruptions through telework, while boosting short-term individual productivity, may present adverse long-term consequences for the organization.

Additional productivity problems are uncovered when we expand the research lens to include not just teleworkers who are avoiding interruptions, but also their office-based colleagues, managers, and reports. In considering this broader group, we might come to suspect that some people now have no one to interrupt, while others stand to be interrupted in the absence of the teleworker. Individuals in both of these groups may find that their own productivity is lessened when others telework.

Although no study has considered the creeping impact of teleworking employees on others in the organization, previous work does provide some evidence that employees left on their own back at the office make adjustments in their patterns of interruption to compensate for the absence of teleworking co-workers and managers (e.g., Mirchandani, 1998a). Additionally, office-bound workers complain that they must pick up the slack teleworkers leave, for example by having to handle client problems and 'fight fires' (Duxbury & Neufeld, 1999). If office-bound colleagues, overburdened by teleworking peers, subsequently seek escape to the home to catch up on their own work, telework might prove a self-reinforcing phenomenon. Moreover, if clericals are less likely to be offered telework than professionals, as current research indicates, the practice of telework might cause mounting frustration among a support staff unable to relieve its stress with occasional days away from an ever more hectic office. Thus, while appearing to be an escape mechanism for a few individuals, telework instead may be fanning the flames of organizational stress and adding to the problems of time management for all employees.

Beyond opening new issues of the changing patterns of work and interruption, the conceptualization of telework as a practice for avoiding interruptions also transforms how we view topics in previous research. For example, in their study of workplace communication, Duxbury and Neufeld (1999) determined that teleworkers did not differ from a control group in terms of the frequency with which they communicated with managers, subordinates, co-workers, and clients. We might find their result reassuring if our concern is professional and social isolation among teleworkers. But if avoidance is the motivation for telework, then this finding is surprising, as we expect employees who wish to avoid interruptions to maintain a low profile. A possible explanation arises in a study by Kompast and Wagner (1998). They report that some teleworkers add to their colleagues' workload through e-mail requests sent from home while making themselves unavailable for the requests of others. We might consider, then, that avoidance is a one-way street for teleworking employees. In this manner, our new conceptualization of telework causes us to reconfigure our ideas of workplace communication by considering that telework might be coincident with a shift in the balance of work requests.

Telework as a means of avoiding interruptions further raises the possibility that office-bound workers will develop negative affect towards teleworking colleagues whose interruptions become theirs. Employees therefore might do well to pursue organizational impression management techniques when they telework. In particular, exemplification and self-promotion tactics (Jones & Pittman, 1982), which individuals might enact to help them be seen as dedicated and competent, respectively, may help teleworking employees to portray themselves as fulfilling their work commitments. Recent work suggests that teleworkers do engage in impression management to convince clients, coworkers, neighbours, and others that they are carrying out actual work tasks in a real work environment (Haddon, 1998; Johnson, 1998). Future research might extend this work by judging the success of impression management techniques in providing a sense that teleworking employees are not only working, but shouldering their fair share of the workload as well.

Finally, if avoidance of interruptions is a primary motivation for telework, then their reduction in the workplace ought to mitigate employees' desires to work away from the office. Perlow (1997) suggests that new work practices, such as the establishment of quiet times in the office, serve to reduce interruptions and improve productivity. Such practices potentially could provide the benefits of a teleworking day (long, uninterrupted, quiet periods of work) without the disadvantages of remote work. By implementing them, firms might facilitate 'virtual teleworking.' But Perlow's study also reveals that maintaining interruption-free periods over time is quite difficult. Thus, if interruptions persist, we must expect that individuals will routinely telework to avoid them.

Moving towards theory-building

Our review indicates that empirical research to date has been largely unsuccessful in identifying and explaining what happens when people telework. By establishing links with existing organizational theories, scholars might develop better explanations of telework's impact. Most past empirical studies of telework fail to make such links. Many of the data on telework are simply described, with no hypotheses presented. Such work constitutes about half the empirical studies; we refer to them as general surveys. Case studies, of which there are a dozen, also tend to be unmotivated by theory; they often serve as short reports of pilot programmes.

Other scholars have noted the atheoretical nature of much telework research (e.g., Hartman *et al.*, 1992; McCloskey & Igbaria, 1998); here, we provide a picture of progress. As seen in Figure 2 (which plots empirical studies by type and year of publication) general surveys and case studies dominate early work, but the number of studies that test explicit hypotheses or build models has grown steadily. We include in this group studies that investigate clearly formed research questions. In the 1980s, such studies comprised little more than 10 per cent of telework research; in the 1990s, they comprised nearly half of all published work. This trend signals the maturing of telework research.

In the absence of theory, prior research serves as the wellspring for many of the hypotheses tested in the empirical studies. A common practice is to test whether teleworker traits or telework advantages culled from small samples in previous studies hold true across larger ones. For example, DeSanctis (1984) tests whether programmers and their managers deem programming jobs suitable for telework, and whether attitudes toward telework vary by demographic traits. She notes that only two empirical studies had been conducted prior to her own (Olson, 1981, 1982), and that both had small samples (40 and 9, respectively). Her sample of 51 managers and 129 programmers represents a considerable improvement in this regard. Some recent work continues to draw upon previous results concerning teleworker demographics and preferences, even as the number of studies has grown (e.g., Baruch, 2000; Bélanger, 1999b; Teo *et al.*, 1999). For example, Bélanger (1999b), basing her arguments on the findings of earlier work, hypothesizes that age, gender, job type, and computer usage will be among

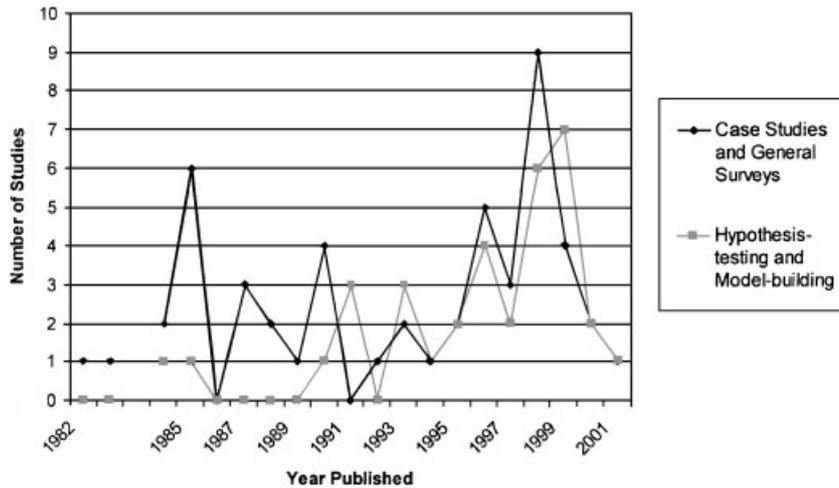


Figure 2. Empirical academic studies of telework by type and year

the factors that discriminate teleworkers from on-site employees in a sample of 76 information workers. By constructing new studies of teleworkers from results of previous ones in this manner, authors insulate telework research from broader organizational studies and fail to develop theory-based explanations for observed phenomena.

Several recent articles have developed and tested hypotheses grounded in theory. Bélanger (1999a) draws upon ideas of communication structures to predict network blocks in a mixed sample of teleworkers and on-site employees. Studies of teleworkers' communication media use draw upon theories of social presence and information richness (Duxbury & Neufeld, 1999; Higa, Sheng, Shin, & Figueredo, 2000) and ideas of social identity (Scott & Timmerman, 1999). Role conflict and spillover models inform Duxbury *et al.*'s (1998) investigation of work and family balance. Kurland and Egan (1999) draw from theories of organizational justice to explore issues of managerial control in the telework context. Telework's adoption by and diffusion among firms is explored using contingency theory (Tomaskovic-Devey & Risman, 1993). Taking a somewhat different tact, Mirchandani (1998b) employs a teleworking sample to explore feminist theorists' call for expanding the notion of what constitutes work. These papers all demonstrate how telework can be viewed through the lens of existing organizational theories.

A number of other avenues for linking telework research to organizational theories exist. Research in social networks and boundaries might provide the theoretical underpinning for predicting how patterns of work and communication in an organization are altered under telework. They might also help in developing arguments for how status and power relationships within a firm both shape, and are shaped, by teleworking arrangements. Social identity theory might be explored further for telework's possible impact on employees' shifting sense of belonging to a specific work group within a firm to their larger sense of being independent agents in greater contact with clients and others beyond the office: a relationship likely to be stronger in those instances where telework alters the nature of the labour contract. Recent interest in time, including studies that consider the trend towards a merging of work time with private time for many professionals, might cast telework as one mechanism in a larger family of remote and virtual work arrangements with similar impacts. On the supply side, studies of corporate and national culture, industry competitiveness, and organizational change processes might provide explanations for why firms do or do not offer telework to their employees. By making

links of this nature to existing organizational theories, researchers can bring telework research into the greater fold of organizational studies, and provide the foundation for developing theory-based explanations for telework, its antecedents and its outcomes.

4. Lessons for the Study of Modern Work

The struggles telework researchers face have been considerable. Definitional issues (i.e., determining who qualifies as a teleworker) have vexed scholars from the very beginning. Locating teleworkers has also been problematic, in part because changes in the labour contract have converted individuals who once were organizational employees into contract workers. Compounding these difficulties, the occasional, infrequent manner in which telework is practised, likely has rendered mute many suspected individual level outcomes for the bulk of the teleworking population.

These difficulties encountered in the study of telework may arise as well in investigations of new forms of work and workplaces. For example, how often must one be on the road to count as a mobile worker? One lesson that the telework literature affords research into other transformations of traditional office-based work is that definition and frequency issues may thwart attempts to build models and theories, especially if the research lens is focused on individual practitioners of the new phenomenon. If researchers examine new work practices more broadly, for example by considering all the parties possibly affected and by looking at outcomes for larger aggregates, they may avoid such problems.

A second lesson from the telework literature arises from the interplay of assumptions and research methods. Combined, these two factors have led telework research into investigations of outcomes that may have little relevance for the majority of individuals who telework. A better tactic for research into new work practices may be to begin with grounded theory-building studies (for methodology, see Eisenhardt, 1989; Glaser & Strauss, 1967; Strauss & Corbin, 1990; for an example of a telework study using grounded theory techniques, see Cooper & Kurland, 2001). By taking such a path, researchers may be more likely to correctly identify the full range of outcomes and parties impacted by changes in how and where work is performed.

A final lesson derived from telework research lies in recognizing that many of the new work practices we observe may be artifacts of the pressures that evolving workplaces place on employees. Scholars might investigate new work practices as mechanisms that employees adopt to occasionally escape from these pressures. They also might begin to investigate root causes. For example, they might consider, as Perlow (1997) did, alterations to office work habits, norms, and practices in an effort to reduce the pressures found in the traditional workplace.

Acknowledgements

This research was supported by National Science Foundation grant DMI-9996081. We wish to thank Steve Barley, Bill Frederick, Pamela Hinds, Bob Sutton, our anonymous reviewers, and Robert Gephart, guest editor of this special issue, for their valuable comments on previous versions of this manuscript.

Author biographies

Diane E. Bailey (PhD, University of California, Berkeley) is Assistant Professor in the Department of Management Science and Engineering at Stanford University and a researcher in Stanford's Center for Work, Technology and Organization. Her current research focuses on the impact of technology on engineering work. She has published research on issues of technology and work in organizational studies and engineering journals. Prior to joining Stanford in 1998, Professor Bailey was on the faculty of the Department of Industrial and Systems Engineering at the University of Southern California.

Nancy B. Kurland (PhD, University of Pittsburgh) is a writer living in Los Angeles. Formerly, she taught at USC's Marshall School of Business and Pepperdine's Graziadio School of Business. She has published articles in *Academy of Management Review*, *Human Relations*, *Journal of Public Administration Research and Theory*, *Organization Science*, *Organizational Dynamics*, and numerous other scholarly journals. Her research has centred on telecommuting and business ethics.

References

- Apgar MI. 1998. The alternative workplace: changing where and how people work. *Harvard Business Review*, **May–June**: 121–136.
- Bailyn L. 1988. Freeing work from the constraints of location and time. *New Technology, Work, and Employment* **3**: 143–165.
- Bailyn L. 1989. Toward the perfect workplace? *Communications of the ACM* **32**: 460–471.
- Baruch Y. 2000. Teleworking: benefits and pitfalls as perceived by professionals and managers. *New Technology, Work and Employment* **15**: 34–49.
- Baruch Y, Nicholson N. 1997. Home, sweet work: requirements for effective home working. *Journal of General Management* **23**: 15–30.
- Becker FD. 1986. Loosely-coupled settings: a strategy for computer-aided work decentralization. *Research in Organizational Behavior* **8**: 199–231.
- Bélanger F. 1999a. Communication patterns in distributed work groups: a network analysis. *IEEE Transactions on Professional Communication* **42**: 261–275.
- Bélanger F. 1999b. Workers' propensity to telecommute: an empirical study. *Information & Management* **35**: 139–153.
- Broder EN. 1996. (Net)workers' rights: the NRLA and employee electronic communications. *Yale Law Journal* **105**: 1639–1670.
- Bureau of Labor Statistics. 1999. *Employment and Wages Annual Averages, December 1999*. U.S. Department of Labor: Washington, DC.
- Bureau of Labor Statistics. 2000. *Employee Tenure Summary*. Accessed December 10, 2001, from <http://www.bls.gov/news.release/tenure.nr0.htm>.
- Cooper C, Kurland NB. 2002. Telecommuting, professional isolation and employee development in public and private organizations. *Journal of Organizational Behavior* **23**: 511–532.
- Crossan G, Burton PF. 1993. Teleworking stereotypes: a case study. *Journal of Information Science* **19**: 349–362.
- Cyber Dialogue Inc. 2000. *Small Business/Home Office Trend Report*: New York.
- DeSanctis G. 1984. Attitudes toward telecommuting: implications for work-at-home programmes. *Information & Management* **7**: 133–139.
- DiMartino V, Wirth L. 1990. Telework: a new way of working and living. *International Labour Review* **129**: 529–554.
- DuBrin AJ. 1991. Comparison of the job satisfaction and productivity of telecommuters versus in-house employees: a research note on work in progress. *Psychological Reports* **68**: 1223–1234.
- Duxbury LE, Neufeld D. 1999. An empirical evaluation of the impacts of telecommuting on intra-organizational communication. *Journal of Engineering and Technology Management* **16**: 1–28.

- Duxbury LE, Higgins CA, Neufeld D. 1998. Telework and the balance between work and family: is telework part of the problem or part of the solution?. In *The Virtual Workplace* (pp. 218–255), Igbaria M, Tan M (eds). Idea Group Publishing: Hershey, PA.
- Egan B. 1997. *Feasibility and Cost Benefit Analysis*. International Telework Association Annual International Conference: Crystal City, VA.
- Eisenhardt KM. 1989. Building theories from case study research. *Academy of Management Review* **14**: 532–550.
- Frolick MN, Wilkes RB, Urwiler R. 1993. Telecommuting as a workplace alternative: an identification of significant factors in American firms' determination of work-at-home policies. *Journal of Strategic Information Systems* **2**: 206–222.
- Gainey TW, Kelley DE, Hill JA. 1999. Telecommuting's impact on corporate culture and individual workers: examining the effect of employee isolation. *SAM Advanced Management Journal* **Autumn**: 4–10.
- Geisler G. 1985. Blue Cross/Blue Shield of South Carolina: programme for clerical workers. In *National Research Council, Office Workstations in the Home* (pp. 16–23), National Academy Press: Washington, DC.
- Gerson JM, Kraut RM. 1988. Clerical work at home or in the office: the difference it makes. In *The New Era of Home-Based Work: Directions and Policies* (pp. 49–64), Christensen KE (ed.). Westview Press: Boulder and London.
- Glaser BG, Strauss AK. 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Aldine de Gruyter: New York, NY.
- Haddon L. 1998. The experience of teleworking: a view from the home. In *Teleworking: International Perspectives* (pp. 136–143), Jackson PJ, Van der Wielen JM (eds). Routledge Press: London.
- Haddon L, Lewis A. 1994. The experience of teleworking: an annotated review. *International Journal of Human Resource Management* **5**: 193–223.
- Hall DT, Richter J. 1990. Career gridlock: baby boomers hit the wall. *Academy of Management Executive* **4**: 7–22.
- Hamblin H. 1995. Employee's perspectives on one dimension of labour flexibility: working at a distance. *Work, Employment & Society* **9**: 473–498.
- Handy SL, Mokhtarian PL. 1995. Planning for telecommuting: measurement and policy issues. *Journal of the American Planning Association* **61**: 99–111.
- Handy SL, Mokhtarian PL. 1996. *The Future of Telecommuting*. *Futures* **28**: 227–240.
- Harrington SJ, Ruppel CP. 1999. Telecommuting: a test of trust, competing values, and relative advantage. *IEEE Transactions on Professional Communication* **42**: 223–239.
- Hartman RI, Stoner CR, Arora R. 1992. Developing successful organizational telecommuting arrangements: worker perceptions and managerial prescriptions. *SAM Advanced Management Journal* **Summer**: 35–42.
- Higa K, Sheng ORL, Shin B, Figueredo AJ. 2000. Understanding relationships among teleworkers' e-mail usage, e-mail richness perceptions, and e-mail productivity perceptions under a software engineering environment. *IEEE Transactions on Engineering Management* **47**: 163–173.
- Hill EJ, Hawkins AJ, Miller BC. 1996. Work and family in the virtual office: perceived influences of mobile telework. *Family Relations* **45**: 293–301.
- Hill EJ, Miller BC, Weiner SP, Colihan J. 1998. Influences of the virtual office on aspects of work and work/life balance. *Personnel Psychology* **51**: 667–683.
- Holcomb B. 1991. Socio-spatial implications of electronic cottages. In *Collapsing Space and Time: Geographic Aspects of Communications and Information* (pp. 342–352), Brunn SD, Leinbach TR (eds). Harper Collins: London.
- Horner D, Day P. 1995. Labour and the information society: trades union policies for teleworking. *Journal of Information Science* **21**: 333–341.
- Huws U. 1991. Telework: projections. *Futures* **23**: 19–30.
- Huws U, Korte WB, Robinson S. 1990. *Telework: towards the elusive office*. John Wiley & Sons: Chichester.
- International Telework Association and Council. 2000. Telework boosted in 1998 by Internet and economy. Accessed March 31, 2000, from <http://www.telecommute.org/>.
- Johnson SA. 1998. Teleworking service management: issues for an integrated framework. In *Teleworking: International Perspectives. From Telecommuting to the Virtual Organization* (pp. 185–206), Jackson PJ, Van der Wielen J (eds). Routledge Press: London and New York.
- Jones EE, Pittman TS. 1982. Towards a general theory of strategic self-preservation. In *Psychological Perspectives on the Self* (pp. 231–263), Suls J (ed.). Lawrence Erlbaum Associates: Hillsdale, NJ.
- Khan MB, Tung LL, Turban E. 1997. Telecommuting: comparing Singapore to southern California. *Human Systems Management* **16**: 91–98.
- Kinsman F. 1987. The homeworker's tale. In *The Telecommuters* (pp. 70–93), Kinsman F (ed.). John Wiley & Sons: New York.

- Kompast M, Wagner I. 1998. Telework: managing spatial, temporal and cultural boundaries. In *Teleworking: International Perspectives* (pp. 95–117), Jackson PJ, van der Wielen JM (eds). Routledge Press: London and New York.
- Korzeniowski P. 1997. The telecommuting dilemma. *Business Communications Review* **April**: 29–32.
- Kraut RE. 1989. Telecommuting: the trade-offs of home work. *Journal of Communication* **39**: 19–47.
- Kraut RR, Fish RS, Root RW, Chalfonte BL. 1990. Informal communication in organizations: form, function, and technology. In *People's Reactions to Technology in Factories, Offices, and Aerospace* (pp. 145–199), Oskamp S, Spacapan S (eds). Sage: Newbury Park, CA.
- Kurland NB, Egan TD. 1999. Telecommuting: justice and control in the virtual organization. *Organization Science* **10**: 1–31.
- Luukinen A. 1996. A profile of Finnish telework: survey results concerning the nature, extent, and potential of telework in Finland. In *Directions of Telework in Finland: Report by the Finnish Experience with Telework Project* (pp. 1–49), Luukinen A (ed.). Ministry of Labour: Publication of Labour Administration, Helsinki.
- Mannering JS, Mokhtarian PL. 1995. Modeling the choice of telecommuting frequency in California: an exploratory analysis. *Technological Forecasting and Social Change* **49**: 49–73.
- Manning RA. 1985. Control data corporation: alternative work site programmes. In *National Research Council, Office Workstations in the Home* (pp. 38–50). National Academy Press: Washington, DC.
- Matthes K. 1992. Telecommuting: balancing business and employee needs. *HR Focus* **69**: 3.
- McCloskey DW, Igbaria M. 1998. A review of the empirical research on telecommuting and directions for future research. In *The Virtual Workplace* (pp. 338–358), Igbaria M, Tan M (eds). Idea Group Publishing: Hershey, PA.
- Metzger RO, Von Glinow MA. 1988. Off-site workers: at home and abroad. *California Management Review* **30**: 101–111.
- Mirchandani K. 1998a. No longer a struggle? Teleworkers' reconstruction of the work–non-work boundary. In *Teleworking: International Perspectives* (pp. 118–135), Jackson PJ, Van der Wielen JM (eds). Routledge Press: London and New York.
- Mirchandani K. 1998b. Protecting the boundary: teleworker insights on the expansive concept of 'work'. *Gender & Society* **12**: 168–188.
- Mokhtarian PL. 1991. Telecommuting and travel: state of the practice, state of the art. *Transportation* **18**: 319–342.
- Mokhtarian PL. 1998. A synthetic approach to estimating the impacts of telecommuting on travel. *Urban Studies* **35**: 215–241.
- Mokhtarian PL, Salomon I. 1996a. Modeling the choice of telecommuting: 2. A case of the preferred impossible alternative. *Environment and Planning A* **28**: 1859–1876.
- Mokhtarian PL, Salomon I. 1996b. Modeling the choice of telecommuting: 3. Identifying the choice set and estimating binary choice models for technology-based companies. *Environment and Planning A* **28**: 1877–1894.
- Mokhtarian PL, Salomon I. 1997. Modeling the desire to telecommute: the importance of attitudinal factors in behavioral models. *Transportation Research Record A* **31**: 35–50.
- Mokhtarian PL, Bagley MN, Salomon I. 1998. The impact of gender, occupation, and presence of children on telecommuting motivations and constraints. *Journal of the American Society for Information Science* **49**: 1115–1134.
- Mokhtarian PL, Handy SL, Salomon I. 1995. Methodological issues in the estimation of the travel, energy, and air quality impacts of telecommuting. *Transportation Research Record A* **29A**: 283–302.
- Nilles JM. 1975. Telecommunications and organizational decentralization. *IEEE Transactions On Communications* **Com23**: 1142–1147.
- Nilles JM. 1994. *Making Telecommuting Happen: A Guide for Telemanagers and Telecommuters*. Van Nostrand Reinhold: New York.
- Norman P, Collins S, Conner M, Martin R, Rance J. 1995. Attributes, cognitions, and coping styles: teleworkers' reactions to work-related problems. *Journal of Applied Social Psychology* **25**: 117–128.
- Novaco RW, Kliwer W, Broquet A. 1991. Home environmental consequences of commute travel impedance. *American Journal of Community Psychology* **19**: 881–909.
- Olson MH. 1981. Remote office work: implications for individuals and organizations. *Center for Research on Information Systems*. New York University: New York.
- Olson MH. 1982. New information technology and organizational culture. *MIS Quarterly* **December**: 71–92.
- Olson MH. 1983. Remote office work: changing work patterns in space and time. *Communications of the ACM* **26**: 182–187.
- Olson MH. 1985. Do you telecommute? *Datamation*, October **15**: 129–132.
- Olson MH, Primps SB. 1984. Working at home with computers: work and non-work issues. *Journal of Social Issues* **40**: 97–112.

- Olszewski P, Mokhtarian PL. 1994. Telecommuting frequency and impacts for State of California employees. *Technological Forecasting and Social Change* **45**: 275–286.
- Perin C. 1998. Work, space and time on the threshold of a new century. In *Teleworking: International Perspectives* (pp. 40–55), Jackson PJ, Van der Wielen J (eds). Routledge: London and New York.
- Perlow LA. 1997. *Finding Time: How Corporations, Individuals, and Families Can Benefit from New Work Practices*. ILR Press: Ithaca, NY.
- Phelps N. 1985. Mountain bell: programme for managers. In *National Research Council, Office Workstations in the Home* (pp. 33–37). National Academy Press: Washington, DC.
- Pinsonneault A, Boisvert M. 2001. The impacts of telecommuting on organizations and individuals: a review of the literature. In *Telecommuting and Virtual Offices: Issues and Opportunities* (pp. 163–185), Johnson NJ (ed.). Idea Group Publishing: Hershey, PA.
- Piskurich GM. 1996. Making telecommuting work. *Training & Development* **February**: 20–27.
- Pratt JH. 1984. Home teleworking: a study of its pioneers. *Technological Forecasting and Social Change* **25**: 1–14.
- Ramsower RM. 1985. *Telecommuting: The Organizational and Behavioral Effects of Working at Home*. UMI Research Press: Ann Arbor, MI.
- Raney JG, Jr. 1985. American Express Company: project homebound. In *National Research Council, Office Workstations in the Home* (pp. 8–15). National Academy Press: Washington, DC.
- Rice RE, Gattiker UE. 2001. New media and organizational structuring. In *The New Handbook of Organizational Communication: Advances in Theory, Research, and Methods* (pp. 544–581), Jablin FM, Putnam LL (eds). Sage Publications, Inc.: Thousand Oaks, CA.
- Salomon I. 1985. Telecommunications and travel: substitution or modified mobility? *Journal of Transport Economics and Policy* **19**: 219–235.
- Salomon I, Salomon M. 1984. Telecommuting: the employee's perspective. *Technological Forecasting and Social Change* **25**: 15–28.
- Scott CR, Timmerman CE. 1999. Communication technology use and multiple workplace identifications among organizational teleworkers with varied degrees of virtuality. *IEEE Transactions on Professional Communication* **42**: 240–260.
- Shamir B, Salomon I. 1985. Work-at-home and the quality of working life. *Academy of Management Review* **10**: 455–464.
- Shirley VS. 1985. F International: twenty years' experience in homeworking. In *National Research Council, Office Workstations in the Home* (pp. 51–56). National Academy Press: Washington, DC.
- Smith IT, Baruch Y. 2001. Telecommuting and the legal aspects. In *Telecommuting and Virtual Offices: Issues and Opportunities* (pp. 1–27), Johnson NJ (ed.). The Idea Group Publishing: Hershey, PA.
- Stanek DM, Mokhtarian PL. 1998. Developing models of preference for home-based and center-based telecommuting: findings and forecasts. *Technological Forecasting & Social Change* **57**: 53–74.
- Strauss A, Corbin J. 1990. *Basics of qualitative research: grounded theory procedures and techniques*. Sage Publications: Newbury Park, CA.
- Teo TSH, Lim VKG, Har WS. 1999. Assessing attitudes towards teleworking among information technology (IT) personnel. *Singapore Management Review* **21**: 33–49.
- Tomaskovic-Devey D, Risman BJ. 1993. Telecommuting innovation and organization: a contingency theory of labor process change. *Social Science Quarterly* **74**: 367–385.
- Turban E, Wang P. 1995. Telecommuting management: a comprehensive overview. *Human Systems Management* **14**: 227–238.
- U.S. Department of Transportation. 1993. Transportation implications of telecommuting. Accessed June 8, 1998, from <http://www.bts.gov/NTL/DOC/telecommute.html>.
- Varma KV, Ho CI, Stanek DM, Mokhtarian PL. 1998. Duration and frequency of telecenter use: once a telecommuter, always a telecommuter? *Transportation Research Record C* **6**: 47–68.
- Watad M, DiSanzo FJ. 2000. Case study: the synergism of telecommuting and office automation. *Sloan Management Review* **41**: 85–96.
- Weiss JM. 1994. Telecommuting boosts employee output. *HR Magazine* **February**: 51–53.
- Westfall RD. 1998. The microeconomics of remote work. In *The Virtual Workplace* (pp. 256–287), Igarria M, Tan M (eds). Idea Group Publishing: Hershey, PA.
- Yap CS, Tng H. 1990. Factors associated with attitudes towards telecommuting. *Information & Management* **19**: 227–235.
- Zamindar M. 1996. Factors behind the adoption of telework as discovered through statistical analysis of employer opinions. In *Directions of Telework in Finland: Report by the Finnish Experience with Telework Project* (pp. 51–57), Luukinen A (ed.) with Pekkola J, Heikkila A, Zamindar M. Ministry of Labour: Publication of Labour Administration, Helsinki.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.