Factors contributing to virtual work adjustment

Sumita Raghuram a,*, Raghu Garud b, Batia Wiesenfeld b, Vipin Gupta a

a Fordham University, 113 W. 60th Street, New York, NY 10023, USA
b Stern School of Business, New York University, 40 W. 4th Street, New York, NY 10003, USA

Received 13 March 2000; revised 2 October 2000; accepted 9 November 2000

Abstract

We explore factors associated with employee adjustment to virtual work. In particular, we explore structural factors (i.e., work independence and evaluation criteria) and relational factors (i.e., trust and organizational connectedness) as predictors of adjustment to virtual work. Additionally, we explore age, virtual work experience and gender as moderators of the relationships. We find that structural and relational factors are important predictors of adjustment and that the strength of the relationship is contingent upon individual differences. We explore the implications of these findings for future research and for practice. © 2001 Elsevier Science Inc. All rights reserved.

1. Introduction

Dramatic changes in the ways that we work are raising new management challenges. Since the early 1980s, when futurist Alvin Toffler’s book “The Third Wave” introduced the concept of the “electronic cottage,” the idea of virtual work has intrigued both management and workers as a welcome alternative to long, traffic-bound commutes, forced captivity in private cubicles, and inflexible, rigid workdays. However, for much of the 1980s and early 90s, the idea of virtual work remained just that: an idea. Many corporations experimented with the concept, allowing a few select employees to work part-time from their home offices, while academics and consultants conjectured about the potential organizational and social hazards of such work arrangements (Kraut, 1989; Olson & Primps, 1984; Shamir & Salomon, 1985). It was not until recent years, after much of the speculation died down, that actual virtual work (i.e., professionals working remotely from home, in cars, from hotels and...
satellite centers and other nonheadquarters locations) has really taken off. Based on a 1999 study, the International Telework Association and Council reports that 10 percent of U.S. adults (19.6 million people) currently telecommute (i.e., work from their homes as a remote office).

The recent proliferation of virtual work has been fueled more by economic necessity than by strategic planning. Organizations continue to downsize and cut costs while seeking ways to become more flexible and customer oriented. The shifting economic pressures of the 1990s have been characterized by the advent of new organizational forms—virtual enterprises, imaginary corporations, dynamic networks, and flexible work teams (Davidow & Malone, 1992; Hedberg, 1994; Lucas & Garud, 2000; Miles & Snow, 1986). Inexpensive computing power, ubiquitous networks and the Internet provide employees access to the information they need to perform their work in locations other than traditional office spaces. These may include satellite work centers, home based work centers, or any other location such as client offices, airports and hotels.

While technological and organizational changes have triggered the emergence of virtual work, its growth and organizations’ ability to benefit from it depends upon how effectively employees are able to adjust to the transition from traditional to virtual work modes. The process of adjustment to a new work context involves adaptation to new environmental demands (Nicholson, 1984). These environmental demands stem from both the way the work is structured and the changing nature of interpersonal relationships (Nelson, 1990). Indicators of successful adjustment may include employees’ performance effectiveness, satisfaction with the new work mode (Caliguiri, Hyland, Joshi & Bross, 1998; Saks, 1995) and, with particular relevance to the virtual work environment, effectiveness in balancing work and non-work demands.

What are the factors associated with adjustment to virtual work? A key facet distinguishing adjustment to virtual work from adjustment to other work contexts is the dispersion of virtual workers. Specifically, virtual work creates distance between employees and their organizations—their supervisors, coworkers, subordinates, and the tangible elements of the organization as a whole. A critical element in employees’ adjustment to this new work mode, therefore, is the effective management of the distance that virtual work creates (Raghuram, Garud & Wiesenfeld, 1998; Wiesenfeld, Raghuram & Garud, 1999a). Distance may be managed through structural mechanisms such as the design of work and the criteria for performance evaluation. Distance may also be bridged through relational mechanisms such as the creation of trust between virtual employees and their interaction partners and by insuring that virtual workers remain connected with respect to important information that may affect their careers.

We explore these structural and relational factors and their relationship to virtual work adjustment in greater detail in this paper. In addition, we explore the moderating effects of individual differences such as age, virtual work experience and gender in relation to adjustment to virtual work. To explore these relationships we first develop hypotheses relating to the structural and relational predictors of adjustment and the effect of individual differences as moderators. Next, we provide details of our research design and the methods that we employed to gather data and to test our hypotheses. We then explore the implications of our findings for future research and practice.
2. Virtual work adjustment

2.1. Structural factors

Structural factors may help manage the challenge created by the distance that is inherent to virtual work settings. One important structural dimension is work independence. Work independence may provide virtual workers with the confidence and ability to work from different locations. Clarity of evaluation criteria is another factor that may ensure effective performance and build accurate expectations among virtual employees.

2.1.1. Work independence

For most of the 20th century, the dominant technology of work allowed for a progressive division of labor. An ability to mass-produce products to exact specifications and the interchangeability of parts allowed tasks to be decomposed into increasingly narrow categories. However, the sequential and reciprocal interdependencies (Thompson, 1967) that were generated between these narrowly defined tasks required continual mutual adjustments between “assembly line” employees, thus favoring co-location of work.

New information technology creates a fundamental shift in the technology of work by allowing increased modularity (Garud & Kotha, 1994; Langlois, 1999). For example, autonomy is facilitated as individuals work asynchronously while accessing common databases through intranets and extranets, secure in the knowledge that they can connect with others in the event of unanticipated constraints or opportunities. The use of e-mail and other electronic communication devices such as beepers and cell phones enhances teamwork (Caldwell & Koch, 2000). These technologies free employees from the need to be co-located with one another in an assembly line fashion. Thus, pooled interdependence is generated, whereby individuals can work autonomously at an individual level without having to sacrifice the benefits of collaboration at a collective level (Thompson, 1967).

In sum, the new technology facilitates work independence—an ability to complete tasks without having to engage in continual interaction with virtual colleagues. Indeed, in our field study, those working virtually reported that their virtual work mode required on-line collaboration, and that such on-line collaboration enhanced rather than diminished their ability to work independently. These observations are consistent with reports from virtual organizations such as Verifone whose employees reported greater independence at the individual level but pooled interdependence at the collective level (Garud & Lucas, 1999).

Often, independence and interdependence at the two levels get confused. This results in generating unnecessary reciprocal and sequential interdependencies at the individual level. In a situation where people are spatially and temporally distributed, such interdependence at the individual level can compromise the adjustment of individuals. Virtual workers who perceive that they have to continually rely on their virtual colleagues (thereby making them reciprocal or sequentially interdependent with others) may experience time pressures, loss of control, and a decline in personal productivity (DeSanctis, Staudenmeyer & Wong, 1999). In contrast, employees who perceive a higher degree of independence are likely to experience greater adjustment to a work context that exploits spatial and temporal dislocation. For all these reasons, we expect:
Hypothesis 1: Work independence will be positively related to employee adjustment to virtual work.

2.1.2. Clarity of evaluation criteria

Clarity of evaluation criteria is important in any context. However, clarity of evaluation criteria can take on special significance in a virtual work context where employees have reduced opportunities for immediate feedback from colleagues and supervisors. Clarity of criteria is key for generating feedback that can guide and reinforce the performance of virtual workers. Moreover, clear evaluation criteria can enhance productivity when managers are unable to physically supervise their subordinates in a virtual setting (Kurland & Egan, 1999; Olson, 1982).

Clear criteria establish expectancy links between efforts and rewards (Mitchell, 1974). Specifically, clear criteria enhance virtual workers’ ability to operate autonomously because employees can track their progress and make necessary adjustments to optimize performance independently. Equally important, clear evaluation criteria establish perceptions of equity among virtual workers who can no longer use physical behaviors to compare work outcomes (Kurland & Egan, 1999). Indeed, the presence of clear evaluation criteria can be essential for building mutual expectations and a perception of procedural fairness that promote a long-term perspective on the employment relationship (Thibaut & Walker, 1975; Wiesenfeld & Brockner, 1998).

To the extent that evaluation criteria are clearly understood, virtual workers are also more likely to pursue initiatives that are valued by the organization (Eisenhardt, 1989). A lack of such clear evaluation criteria, however, can lead to a vicious cycle of interactions between virtual workers and their organizational counterparts. Specifically, ambiguities that arise from a lack of clarity can lead virtual workers to inadvertently pursue inappropriate goals that undermine their performance and consequently diminish their organizational relationships. For all these reasons, we expect:

Hypothesis 2: Clarity of evaluation criteria will be positively related to employee adjustment to virtual work.

2.2. Relational factors

So far, we have explicated how structural factors can help overcome barriers to adjustment to virtual work. We now explicate how relational factors are associated with adjustment. Specifically, we explore how relational factors may serve to bridge the psychological distance that virtual work inherently involves. For instance, factors that create the perception of stronger and more enduring relationships between virtual workers and their organizational interaction partners may give virtual workers greater confidence in their general and long-term association with the organization, facilitating their adjustment to the new work context (Wiesenfeld, Raghuram & Garud, forthcoming). Perceptions of interpersonal trust and organizational connectedness are likely to be especially important as predictors of a stronger and more enduring relationship between virtual workers and their interaction partners and, thus, of adjustment.
2.2.1. Interpersonal trust

Interpersonal trust refers to expectations, assumptions, or beliefs about the likelihood that another’s future actions will be beneficial, favorable, or at least not detrimental to one’s interests (Frost, Stimpson & Maughan, 1978; Gambetta, 1988). Thus, the level of interpersonal trust is an important feature defining virtual workers’ relationships with their interaction partners within the organization.

Interpersonal trust is important from the perspective of a supervisor and from the perspective of an employee. From a supervisory perspective, trust acts as an implicit mechanism for control and coordination (Creed & Miles, 1996). From an employee perspective, trust has been shown to enhance performance and diminish turnover intentions (Robinson, 1996). There is evidence suggesting that when organization members trust one another, employees are less anxious about work-related concerns (Ryan & Oestreich, 1998). Trust is therefore an important factor predicting employees’ adjustment.

Handy (1995) suggests that trust must replace traditional means of control to realize the benefits of virtual work. Interpersonal trust has special significance in a virtual context because physical distance creates uncertainties regarding whether others’ (supervisors’ or coworkers’) actions will be beneficial or favorable. Furthermore, virtual workers cannot directly witness others’ behaviors as easily as they can in traditional organizational settings where individuals operate in close proximity to one another. Therefore, virtual workers must rely more heavily on expectations about how others may act—i.e., interpersonal trust. When trust is high, expectations will be positive and virtual workers will have confidence and diminished uncertainty. Thus, in a virtual setting, interpersonal trust can prevent physical distances between organizational members from becoming psychological distances (O’Hara-Devereaux & Johnson, 1994).

Virtual workers who feel that they have their supervisor’s trust are more likely to conform to organizational expectations. For example, Verifone managers operated on the notion that “trust begets trust” (Taylor & Carroll, 1995). Conversely, supervisors who feel trusted by their subordinates are more likely to adopt managerial approaches that are appropriate for the virtual work context—i.e., mentorship and support rather than monitoring and control (Wiesenfeld, Raghuram & Garud, 1999b). Empirical evidence suggests that trust among peers in a virtual setting leads to more effective communication, collaboration and mutually acceptable ways of coordinating work (Jarvenpaa & Leidner, 1999; Kurland & Egan, 1999). Therefore we expect:

Hypothesis 3: Interpersonal trust will be positively related to employee adjustment to virtual work.

2.2.2. Organizational connectedness

By organizational connectedness we mean the extent to which individuals perceive that they are central to, visible in and involved with the organizational community. Individuals inherently wish to be part of a broader social context (Baumeister & Leary, 1995). Connections to the social context provide employees with a feeling that there is a community that they can rely upon for support and information. This is useful for accomplishing immediate work requirements and for defining a longer-term relationship with the organization. Con-
nectedness with the organizational community yields opportunities for exposure and visibility through which individuals can demonstrate their capabilities and thus feel more confident in their job security and career development (e.g., Chao, Walz & Gardner, 1992). In an organizational setting, effective adaptation is therefore, in part dependent upon employees’ sense of connectedness to their organization.

Developing and maintaining organizational connectedness may be particularly challenging in a virtual work setting because informal contact with supervisors and peers may be less frequent (Cascio, 2000). One of the most frequently cited causes of concern for virtual workers is the possibility that their infrequent presence in the organization may make them “out of sight, out of mind”, and that this will inhibit their career advancement (Watad & Di Sanzo, 2000). Kurland and Egan (1999) suggest that professional isolation of this kind may affect virtual workers’ opportunities for participating in, and receiving the benefits of, organizational membership. Organizational connectedness may be a function of the communication and socialization behavior of individual virtual workers. Some may be better than others in maintaining contact with interaction partners either through media such as telephone or e-mails, or through efforts to build relationships on occasions that they meet interaction partners face to face. Virtual workers who have low organizational connectedness may lack insight into desired behaviors that should be exhibited to obtain immediate performance outcomes or future career opportunities. However, when they have sufficient organizational connectedness, they are likely to feel central to and involved with the organization, which may promote organizational attachment and allay any concerns regarding their career progression. For all these reasons, we expect:

**Hypothesis 4:** Organizational connectedness will be positively related to employee adjustment to virtual work.

### 2.3. Individual factors

Thus far, we have outlined structural and relational factors that may be associated with employee adjustment to virtual work. These include employees’ work independence, the clarity of evaluation criteria, the level of interpersonal trust and organizational connectedness. In this section we explore the extent to which the strength of these predictors of employee adjustment varies across individual virtual workers. Specifically, we explore the moderating effects of age, virtual work experience and gender.

#### 2.3.1. Age as a moderator

Age may influence the relative importance of relational versus structural predictors of employee adjustment. Specifically, we expect older workers to take a longer term view of their association with the organization and their jobs relative to younger workers. Relational factors such as trust and organizational connectedness are indicative of the nature of their future relationship with the organization. Younger workers may be more concerned about maximizing immediate benefits and rewards and, therefore, may be particularly sensitive to structural factors that indicate how they will be evaluated and how they may behave on the
job (i.e., work independence and clarity of evaluation criteria). For these reasons, we expect that older virtual workers’ adjustment to the virtual work context may be more responsive to relational factors than their younger counterparts. Conversely, we expect younger virtual workers to be more responsive to structural factors than older workers.

The moderating effect of age may operate through both lifecycle and generational processes. From a lifecycle perspective, older workers may be more likely to have, over time, selected themselves into a career and organization that they feel comfortable in and intend to remain with in the future. They may perceive that they have invested more in the organization and in their careers, making them more concerned about maintaining their relationship with the organization. Furthermore, they may have more demanding current and future responsibilities (a mortgage, college education for their children, saving for retirement) that makes them value stability and security. Younger workers, in contrast, may be less willing to sacrifice immediate goals for future benefits. Therefore, they are likely to be more concerned with obtaining rewards linked with explicit evaluation criteria and with maintaining autonomy and personal performance.

A generational perspective suggests similar patterns but for different reasons. Specifically, older workers came of age in an era where organizations were still promising security in exchange for their employees’ commitment and loyalty. Thus, older workers’ expectations of their work and organizational relationships are more likely to involve relational concerns—they may wish to spend an entire career working their way up the ladder in a large, prestigious organization. This implicit psychological contract was altered as a result of the era of downsizing and layoffs that began in the mid-80s (Wiesenfeld & Brockner, 1998). Those workers who came of age after these events are more likely to view their career as their own responsibility, less likely to expect their employer to be loyal to them, more likely to move between organizations and more likely to value entrepreneurship. In the newer version of the psychological contract, immediate goals that are best addressed through structural factors may take precedence over relational issues. For all these reasons, we expect:

**Hypothesis 5:** Age will moderate the relationship between employees’ adjustment to virtual work and its predictors such that younger workers’ adjustment will be more strongly associated with work independence and evaluation criteria and older workers’ adjustment will be more strongly associated with trust and organizational connectedness.

### 2.3.2. Experience with virtual work as a moderator

Adjustment to new work modes is influenced by the amount of experience that individuals have with the work mode (Nelson, Quick & Eakin, 1988). Early encounters with virtual work (as with any new work mode) may be experienced as surprising or uncomfortable. The practices involved in virtual work are novel and may at first appear to be highly uncertain and ambiguous. When individuals encounter new, surprising, and uncertain situations, they often seek to establish control (Baumeister, 1984). In the first stage of adjustment, they may focus on alleviating immediate problems and their attention may be drawn to task-related chal-
lenges (Argyris, 1985). For instance, virtual workers may initially focus on learning how to best use communication technologies to coordinate and collaborate with their supervisors and peers while working from a distance (DeSanctis et al., 1999).

The initial motivation to obtain control and focus on immediate task issues may be addressed through structural mechanisms directed at managing the distance inherent in virtual work. Specifically, an ability to work independently and clarity of evaluation criteria may enhance virtual workers’ perception of initial control in the virtual context. With greater experience, however, individuals may grow accustomed to the practices and procedures involved with virtual work and, therefore, may be less concerned by the uncertainty and ambiguity surrounding their task management. Their focus may become broader, concerning long-term outcomes as well as their relationships with others. Therefore, the adjustment of individuals with greater experience with virtual work may be more strongly related to implicit relational mechanisms such as trust and organizational connectedness because such factors are diagnostic of broad and long-term concerns (Graen & Scandura, 1987). For all these reasons, we expect:

*Hypothesis 6:* Experience with virtual work will moderate the relationship between employees’ adjustment to virtual work and its predictors, such that less experienced workers’ adjustment will be more strongly associated with work independence and clarity of evaluation criteria and more experienced workers’ adjustment will be more strongly associated with trust and organizational connectedness.

2.3.3. Gender as a moderator

By creating opportunities for individuals to work from home, virtual work inherently influences the relationships between the work and non-work roles individuals play, making it easier for one role to overlap with another. Men and women may occupy these roles quite differently, therefore experiencing different pressures in a virtual setting which may lead them to respond differently to the factors associated with employee adjustment. In particular, women may respond more positively to factors that clearly define the work domain, providing them greater control over work in their effort to balance the pressures of their nonwork responsibilities. Men, on the other hand, may view themselves as working out of a non-traditional location. Consequently, men may respond more positively to factors that enable maintenance of organizational membership even as they work out of their homes.

Following this logic, we expect that women’s adjustment to virtual work may be more strongly influenced by factors such as explicit performance criteria and more independent tasks that facilitate greater personal control and define the boundaries of the work role more clearly. On the other hand, men’s adjustment to virtual work may be more strongly influenced by interpersonal trust and connectedness, which enable a strong link to the organization even when they are not physically present.

*Hypothesis 7:* Gender will moderate the relationship between employees’ adjustment to virtual work and its predictors, such that women’s adjustment will be more strongly associated with work independence and clarity of evaluation criteria and men’s adjustment will be more strongly associated with trust and organizational connectedness.
3. Research design and methods

This study is an outcome of ongoing research that combines insights from several sources and methods. To gain a comprehensive understanding of the virtual work phenomenon, we interviewed several different constituencies affected by virtual work. These included virtual workers, virtual work program managers, subordinates of virtual workers, “traditional” workers who work with virtual workers, and industry observers studying the virtual work phenomenon.

We developed a survey instrument assessing constructs drawn from the existing literature on virtual work as well as from our interviews. The survey instrument was refined at several stages with different groups of virtual workers. At one stage, for instance, we incorporated respondents’ suggestions to measure “experience with virtual work” into the survey. Moreover, we also contextualized the survey so that it would have greater face validity to the respondents.

Through this iterative process, we developed a questionnaire that was relevant to the virtual work context and composed of a reliable set of measures. The specific instrument that we used for this study was pre-tested on a sample of 100 virtual workers and their managers. The pre-test sample was drawn from an organization that was different from the one that we have employed for this study, but from the same industry (i.e. the telecommunications industry).

We circulated the questionnaire to all of the 2400 formally registered virtual workers in a telecommunications organization that offers a voluntary virtual work program. Of the 2400, we received usable responses from 756 virtual workers, yielding a 32% response rate. Of 756 respondents, 504 (i.e., 67%) were females; consistent with the proportion of women registered in the virtual work program (i.e., 60%). The mean tenure was 9.8 years in our sample as compared to 9.7 years among all program participants. The average experience with virtual work was 18.94 months in our sample, approximating the 21 months of experience among all program participants. The consistency between our sample profile and statistics regarding all program participants suggests that non-response bias was not a significant concern.

The respondents represented a variety of different job categories and job levels. These included managers and technical personnel such as software designers, engineers, marketing and sales personnel, and project and account managers. The mean age of our study participants was 40.6 years. The minimum and maximum ages reported were 21 and 67 years, respectively.

The survey instructions explained the purpose of the survey to the respondents, i.e. to understand issues related to virtual work. We asked the virtual workers to answer all questions with respect to the virtual work context that they were operating in.

3.1. Measures

We used a 7-point scale for all measures described below. Higher values indicate a higher level of agreement. The specific items used in this study are in Appendix A.
3.1.1. Dependent variable

We measured employee adjustment to virtual work with a 5-item scale assessing satisfaction with virtual work, job performance as a consequence of virtual work, productivity, commitment to virtual work, and ability to balance work and non-work demands (alpha = .77). Previous research suggests that these factors are critical indicators of employee adjustment to new work contexts. For example, newcomer adjustment has been operationalized as individuals’ ability to cope, job satisfaction, organizational commitment, performance and intent to remain with the organization (Saks, 1995; Nelson et al., 1988). For expatriates, adjustment has been operationalized as individuals’ ability to live and work well in cross national settings, i.e., the extent to which expatriates feel comfortable and adapted to living in their host country and their intent to continue with the foreign assignment (e.g. Caliguiri et al., 1998).

We chose to view virtual workers’ adjustment as an overall state of adaptation because of the inherent tradeoffs involved in adjustment. For instance, expending greater effort to increase productivity may be traded off for greater work/non-work balance, and thus an overall measure of adjustment may most accurately assess virtual workers’ relative level of adaptation to environmental demands. We considered the virtual workers to be the best source for this information because our measures were focused on self-perceived adjustment.

3.1.2. Independent variables

Work independence was measured using three items based on the items developed by Sims, Szilagyi and Keller (1976). Respondents indicated the degree to which their performance depended on working with others, whether they need to work independently to perform effectively, and whether their work primarily involved completing independent tasks or projects (alpha = .79).

Clarity of evaluation criteria was measured using three items developed for the study. Respondents indicated the degree to which their evaluation criteria were objective, the ease of measuring and quantifying their performance, and the clarity of job performance measures (alpha = .90).

We measured interpersonal trust using four items modeled on a study conducted by Brockner, Siegel, Daly, Tyler and Martin (1997). Our measure focused on interpersonal trust within an organizational group (Dirks, 1999). Since interpersonal trust has been viewed as a complex and dynamic construct (Golembiewski & McConkie, 1975), our measurement strategy focused on utilizing an overall measure of trust rather than assessing the many specific determinants of trust. Two items measured the extent to which the individual trusted his/her supervisor and peers, and two items measured the extent to which virtual workers perceived that their supervisor and peers trusted them (overall alpha = .86).

Organizational connectedness was measured with a 4-item scale. Two of these were modified versions of the items developed by Noe and Wilk (1993). These two items measured the extent to which individuals were aware of company issues that could influence their career plans, and the extent to which they were aware of specific opportunities for exposure and visibility on the job. The other two were based on our own interviews with virtual workers and measured the extent to which the social events in the organization and...
work related meetings built a sense of community and strong interpersonal relationships (alpha = .83).

3.1.3. Control variables
Experience with virtual work, tenure in the organization (in years), age and gender (0 = male, 1 = female) were entered as control variables in the analyses testing Hypotheses 1 to 4. Organizational tenure was used as a control variable while testing for the moderating influence of age, gender and virtual work experience.

4. Analyses and results

We conducted a confirmatory factor analysis (EQS 5.6) to isolate the degree of measurement error and assess whether the items measuring the dependent and independent variables captured the proposed underlying dimensions and were statistically free of common-response bias. We ran two separate confirmatory factor analysis models for the dependent variable and the independent variables. The goodness of fit for these models is evaluated using average absolute standardized residuals, Bentler-Bonett Normed Fit Index (NFI), Bentler-Bonett Nonnormed Fit Index (NNFI) and Comparative Fit Index (CFI). A value less than 0.05 is considered an acceptable norm for the standardized residuals, and a value of 0.90 is considered an acceptable norm for the other three indices (Bentler, 1995).

The confirmatory factor analysis provided acceptable goodness of fit for the virtual work adjustment construct (comprised of 5 items): NFI was 0.918, NNFI was 0.929, CFI was 0.936. The average absolute standardized residual was 0.047. For the independent variables, we specified a four-factor measurement model (work independence, clarity of evaluation criteria, interpersonal trust, and organizational connectedness). After adjusting for common variance attributable to the virtual work context, we found that the four independent variable constructs can be effectively discriminated. The NFI was 0.954, NNFI was 0.958 and CFI was 0.968, with average absolute standardized residuals being 0.041. Thus, the results of the confirmatory factor analyses suggest that the measures of the dependent and independent variables capture the proposed underlying dimensions and can be effectively discriminated from one another.

Descriptive statistics for the variables are summarized in Table 1. The correlation analyses suggest that the dependent variable, adjustment to virtual work, was correlated with respondents’ perceptions of work independence, clarity of evaluation criteria, interpersonal trust, and organizational connectedness in the hypothesized directions—providing preliminary support for our model.

4.1. Regression results

To test Hypotheses 1–4, we used hierarchical (OLS) regression. In the first step, we regressed adjustment to virtual work on the control variables. At this step we found that gender was significantly related to adjustment, such that women reported greater adjustment to virtual work (β = .09, p < .05). In the second step, we added the four main effects (i.e.,
work independence, evaluation criteria, interpersonal trust and organizational connectedness) simultaneously. The regression model explained 19% of the variance in adjustment to virtual work (Table 2). All four main effects, clarity of evaluation criteria ($\beta = .17, p < .01$), work independence ($\beta = .19, p < .01$), interpersonal trust ($\beta = .14, p < .01$) and organizational connectedness ($\beta = .14, p < .01$) were significant, thus supporting Hypotheses 1–4.

Hypotheses 5 and 6 suggested that age and virtual work experience would moderate the relationship between the four main effects and adjustment to virtual work. We also explored the moderating effect of gender on the relationship between the main effects and adjustment to virtual work. To test these effects, we zero-centered all continuous variables following the procedure recommended by Aiken and West (1991) and Cronbach (1987), and then performed moderated regression analyses. We added the interaction terms in the third step to the model containing the four main effects and the control variables. The results reported in Table 2, step 3 include the control variables, the main effects and the significant interactions.

We find significant interactions between age and clarity of criteria ($\beta = -.10, p < .01$), age and work independence ($\beta = .08, p < .05$), and age and interpersonal trust ($\beta = .09, p < .01$). The interaction between virtual work experience and interpersonal trust was also significant ($\beta = .08, p < .05$). Additionally, the interaction of gender and organizational connectedness yielded a significant result ($\beta = -.09, p < .05$).

We plotted the significant interactions to illustrate their nature. Specifically, we conducted median splits for age and the corresponding main effect and plotted the mean level of adjustment for each category. We found a stronger relationship between work independence and adjustment for older workers (Fig. 1), contrary to our hypothesis. In comparison to the younger virtual workers, for the older age group we found that there is a weaker relationship between clarity of criteria and adjustment (Fig. 2) and a stronger positive relationship between trust and adjustment (Fig. 3). These two results are consistent with our hypotheses.

We find a stronger positive relationship between interpersonal trust and virtual work adjustment among individuals who have had more experience with virtual work relative to those with less experience (Fig. 4). This pattern is consistent with our hypothesis.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<td>1. Interpersonal trust</td>
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<td>1.01</td>
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<td>3. Work independence</td>
<td>3.7</td>
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<td>0.06</td>
<td>0.15**</td>
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<td>4. Clarity of criteria</td>
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<td>1.46</td>
<td>0.37**</td>
<td>0.46**</td>
<td>0.29**</td>
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<td>5. Age</td>
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<td>8.17</td>
<td>0.01</td>
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<td>6. Gender</td>
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<td>0.47</td>
<td>0.02</td>
<td>0.06</td>
<td>0.08*</td>
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<td>6.54</td>
<td>0.04</td>
<td>0.11**</td>
<td>0.02</td>
<td>0.05</td>
<td>0.46**</td>
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<td>-0.00</td>
<td>0.13**</td>
<td>0.01</td>
<td>0.13**</td>
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<td>0.27**</td>
<td>0.32**</td>
<td>0.28**</td>
<td>0.36**</td>
<td>.04</td>
<td>0.09*</td>
<td>0.04</td>
<td>0.04</td>
</tr>
</tbody>
</table>

** $p < .01$, * $p < .05$; N = 756.
Table 2
Hierarchical regression analysis predicting virtual work adjustment

<table>
<thead>
<tr>
<th>Variables</th>
<th>Step 1 Control variables</th>
<th>Step 2 Main effects</th>
<th>Step 3 (i) Moderator: (age)</th>
<th>Step 3 (ii) Moderator: (virtual work experience)</th>
<th>Step 3 (iii) Moderator: (gender)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β (Std.)</td>
<td>t</td>
<td>β (Std.)</td>
<td>t</td>
<td>β (Std.)</td>
</tr>
<tr>
<td>Age</td>
<td>.03</td>
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<td>.02</td>
<td>.38</td>
<td>−.01</td>
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<tr>
<td>Gender</td>
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<td>2.48</td>
<td>.06</td>
<td>1.71</td>
<td>.06</td>
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<tr>
<td>Tenure in organization</td>
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<td>0.36</td>
<td>−.01</td>
<td>−.17</td>
<td>−.01</td>
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<tr>
<td>Virtual work experience</td>
<td>.05</td>
<td>1.20</td>
<td>.06</td>
<td>1.83</td>
<td>.06</td>
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<tr>
<td>Clarity of criteria</td>
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<td></td>
<td>.17**</td>
<td>3.98</td>
<td>.17**</td>
</tr>
<tr>
<td>Work independence</td>
<td>.19**</td>
<td>5.14</td>
<td>.18**</td>
<td>4.85</td>
<td>.19**</td>
</tr>
<tr>
<td>Interpersonal trust</td>
<td>.14**</td>
<td>3.72</td>
<td>.14**</td>
<td>3.61</td>
<td>.15**</td>
</tr>
<tr>
<td>Organizational connectedness</td>
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<td>3.38</td>
<td>.13**</td>
<td>3.23</td>
<td>.13**</td>
</tr>
<tr>
<td>Clarity of criteria* age</td>
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<td></td>
<td></td>
<td></td>
<td>−.10**</td>
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<tr>
<td>Work independence* age</td>
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<td></td>
<td></td>
<td></td>
<td>.08*</td>
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<tr>
<td>Trust* age</td>
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<td></td>
<td>.09**</td>
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<td></td>
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<tr>
<td>Trust* virtual work experience</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connectedness* gender</td>
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<tr>
<td>R-square (adjusted)</td>
<td>.007</td>
<td>.189**</td>
<td>.199**</td>
<td>.193**</td>
<td>.195**</td>
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<tr>
<td>F-value</td>
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<td>20.54**</td>
<td>16.21**</td>
<td>18.84**</td>
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<td>F-change</td>
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</table>

** p < .01, * p < .05.
As Fig. 5 shows, males demonstrate a stronger relationship between organizational connectedness and virtual work adjustment than females.

5. Discussion and future directions

The results of our study suggest that both structural and relational factors contribute to virtual work adjustment. Specifically, work independence, clarity of evaluation criteria, trust and organizational connectedness are significantly associated with adjustment—findings that have important implications for research and practice with regard to managing in the information age.

We also found that age, gender and virtual work experience moderated the relationship between virtual work adjustment and structural and relational factors. One surprising result of our study emerged with regard to the moderating effect of age. While we did find that older workers were more positively responsive to interpersonal trust and less responsive to the clarity of the evaluation criteria, we also found that older workers were more positively responsive to a structural means of managing distance—work independence. One possible explanation for this result is that older workers may have a greater need for autonomy than their younger counterparts (Laud, 1983). If so, independence and autonomy may be more salient and influential for older workers than we had hypothesized.
Our findings suggest that men have a stronger relationship between organizational connectedness and virtual work adjustment than women. We conjecture that men, in comparison to women, may be more sensitive to the effect of organizational connectedness on their long-term careers in the organization. Another possible explanation may be that women find it more difficult to be connected with the organization because they do not have access to the information networks and power bases that men traditionally have had access to (Noe, 1988). Consequently, connectedness is not as important a mechanism for adjustment of women as compared to men. Future research could evaluate the degree to which this finding is replicated in other virtual work contexts and the causal mechanisms underlying this pattern.

Our finding that women reported greater adjustment is consistent with earlier research. For example, Hall and Parker (1993) suggest that women will be particularly responsive to flexible work modes that offer them greater control over their time and place of work. Women who perceived that their organizations offered flexible work hours have been found to report higher levels of organizational commitment and job satisfaction than women who did not (Scandura & Lankau, 1997). Further, evidence indicates that female virtual workers are more productive than male virtual workers (Hill, Miller, Weiner & Colihan, 1998). Thus, virtual work may be especially consistent with the role demands that women face.

5.1. Limitations

Observations about the research site have implications for how the findings from this study should be interpreted. Our sample consisted of employees who worked for a large
telecommunications network provider. These employees were savvy with the use of electronic media. Moreover, the company offered its virtual workers considerable technical support. It would be useful to refine our observations on work independence by gathering data from multiple organizations that offer virtual workers differential technology support. Additionally, we can generate deeper insights regarding this issue by exploring the impact of independence on adjustment for employees who vary with regard to their ability to use information technologies.

Another facet of this research site is that employees had volunteered to participate in the virtual work program. Consequently, the findings from this study are most readily generalizable to other voluntary virtual work settings. The fact that such employees are not compelled to adopt this work mode can be a factor in determining their adjustment. In this regard, it would be interesting to compare these results with findings from a mandatory virtual work program. The structural and relational facets that we have introduced in this study could be all the more relevant for adjustment in mandatory programs.

This is a cross-sectional study and therefore our results should be interpreted as correlational. However, our inclusion of a variable measuring experience with virtual work is suggestive of some of the effects of time on adjustment. It would be useful to track a cohort group of virtual workers over time to conduct longitudinal research which may further validate our results.
Fig. 4. Interaction of virtual work experience with interpersonal trust.

Fig. 5. Interaction of gender with organizational connectedness.
5.2. Future research agenda

At the broadest level, our findings confirm what others have suspected—that it is inadequate to focus only on information technologies when designing virtual work programs and that there is merit in examining structural and relational facets as well. Refining this observation to generate nuances across settings and cultures should be a key part of a research agenda on virtual work.

Consider work independence, for instance. A significant impact of this new technology is its ability to provide employees an opportunity to work undisturbed for stretches of time even while providing them with an option to connect with others as and when required. Although earlier technologies such as the telephone have offered employees similar opportunities, the new information technologies such as e-mail and the Internet add an altogether new dimension to communication between distributed employees. Specifically, these new technologies offer individuals an opportunity to communicate asynchronously with one another.

Given this facet of the new technology of work, virtual work programs that embrace work designs consistent with the mass production context may impose unnecessary interdependencies between virtual workers. These interdependencies, in turn, can compromise employees’ ability to adjust to a work mode that requires a different logic. Research in this regard would be useful to gain a deeper understanding of the new technology of work.

Future research on the impact of evaluation criteria on adjustment can extend our findings. We found that the extent to which evaluation criteria are clear and specific is an important determinant of virtual work adjustment. However, clarity and specificity does not mean that evaluation criteria must be static. The tasks that virtual workers perform tend to be fluid. Thus, what is required of virtual workers and how they will be evaluated should adapt as well. Research that can shed light on how clarity and specificity of evaluation criteria interact with adaptability to determine employee adjustment would be useful.

Findings from this study confirmed the importance of interpersonal trust for adjustment in virtual work settings. Moreover, these findings suggest that trust assumes greater significance as virtual workers become more experienced. These findings are useful in directing our attention to several research questions. For instance, what are the mechanisms whereby trust is generated and maintained? Do these mechanism change overtime? Jarvenpaa and Leidner (1999) suggest that electronic communications play an important role in trust building. It would be interesting to extend these observations by studying the impact other communication technologies such as video-conferencing may have on trust. Socialization to company culture could be another important mechanism. Specifically, it would be interesting to compare the impact of trust on adjustment of newcomers who have not been socialized to a company’s culture prior to their embracing virtual work with longer tenured and more socialized employees.

An important correlate of adjustment appears to be the extent to which virtual workers perceive that they are connected with their organization and remain “in-the-loop”. What are the mechanisms that underlie these organizational ties? It is worthwhile to examine why some virtual workers are better than others at maintaining such ties with their organizations. Questions that arise in this regard are—To what extent do these virtual workers meet one another face to face? Do successful virtual workers spend time talking about non-work issues
with peers on occasions when they do visit their central offices? Do they build informal social networks or do they join electronic communities to help them stay connected? We found that men appear to be more sensitive to organizational connectedness relative to women. What may account for such differential sensitivities? Answers to questions such as these can help unpack the dynamics of how employees can remain connected with the organization even as they work virtually.

The distance created by virtual work may be symmetrical. That is, co-workers who remain in the office may be as much removed from their virtual counterparts as virtual workers are from their centralized co-workers (Raghuram et al., 1998). In this regard, it would be interesting to extend this research to explore the adjustment of those who remain in the office when their co-workers begin working virtually. Those who remain in the office often have to bear the brunt of managing the day-to-day requirements of running the office while not being able to take advantage of the benefits that virtual work has to offer.

Given the findings of this study, the role of managers in managing virtual work is a prime area for inquiry (Wiesenfeld et al., 1999b). How can managers shape and augment structural and relational factors of virtual work to facilitate adjustment? Does the fact that a manager is virtual or located in a central office make a difference to the adjustment of virtual workers? These are all fruitful avenues for exploration as we begin building an understanding of virtual work.

5.3. Practical implications

This study confirms the importance of both structural and relational facets of virtual work programs for determining virtual work adjustment. These findings suggest that it is not enough to provide employees with laptops and set them free into a virtual work mode. Organizations may make the mistake of not paying adequate attention to the design of structural and relational factors of their voluntary virtual work initiatives under the assumption that permission to work virtually is an employee perk. Such an omission could be detrimental to adjustment. An employee’s choice to work virtually may be based on several considerations that range from difficult commutes to a desire to work undisturbed for long time periods. Tradeoffs may be involved in balancing conflicting objectives that could be addressed to enhance adjustment.

For instance, careful attention must be placed on issues such as the type of work interdependencies between virtual workers, how individuals are evaluated, how trust can be generated, and how virtual workers’ organizational connectedness can be maintained. It is important to remember that the key to this technology of work lies in allowing individuals to work individually while providing them with an opportunity to connect with one another as and when required. That is, individuals can be more productive as they work in parallel in a distributed fashion. To facilitate such a process, it is important to develop clear and explicit evaluation criteria.

With respect to the relational factors of virtual work, there are several other initiatives that managers could explore. Socialization and career management programs are two key initiatives. Social events and small group meetings are specific tools that can be employed to build trust and organizational connectedness in a virtual work environment (Handy, 1995).
These meetings could help individuals learn about others’ experiences, skills, motives and expectations. This kind of learning usually takes place around “water-coolers” in traditional organizations. Similar forums may have to be built into virtual work programs in the form of periodic department meetings and social events.

Career management initiatives such as formal mentoring programs may be useful in enhancing connectedness of virtual workers who feel marginalized (Ragins, 1997). Organizations may also wish to evaluate the appropriate career stage for employees to go virtual with an eye towards minimizing potential adverse effects. For instance, virtual work might be better suited to individuals who have been socialized to the organizational culture and who have stabilized in their careers.

Fostering appropriate communication between those involved in virtual work is another way by which trust may be cultivated in a virtual work context. For instance, ensuring a high level of “social” communication delivered in a predictable and timely fashion conveying enthusiasm about tasks may be important for trust-building using electronic media (Jarvenpaa & Leidner, 1999). Our results suggest that such trust-building efforts, if put in place early on, may facilitate adjustment as virtual workers are sensitive to trust in the long run. Such trust-building also becomes important for managing older employees.

6. Conclusion

Virtual work is becoming an increasingly important mode of work with the widespread use of information technologies. We have offered a perspective on factors that influence the adjustment of virtual workers. Specifically, we have focused on structural and relational aspects of the virtual work environment as well as the moderating effects of individual characteristics such as age, gender and virtual work experience.

Findings from this large sample study are encouraging as they validate the importance of many of these factors in determining adjustment to virtual work. Our findings not only have implications for future research on virtual work, but also for the practical challenges of managing virtual work initiatives. As an increasing number of organizations embrace this new work mode, and as the technology of work continues to change, we will see an accumulation of insights on this topic. Towards this end, our study is but one that offers valuable empirical findings on factors that must be addressed to ensure adjustment of the employees who utilize these new work modes.

Acknowledgment

We thank Rhonda Reger and three anonymous reviewers for their valuable inputs to an earlier version of this paper.

The study was funded in part by a grant from Society for Human Resource Management. The conclusions, interpretations and recommendations, however, are those of the authors and do not necessarily represent those of the foundation.
Appendix A. Items used in the study

A.1. Work independence

1. My performance does not depend on working with others.
2. To perform my best, I need to work independently.
3. My work primarily involves completing independent task or projects.

A.2. Clarity of criteria

1. There are objective criteria by which my performance can be evaluated.
2. It is easy to measure and quantify my performance.
3. The measures of my job performance are clear.

A.3. Organizational connectedness

1. I am aware of problems in my company that can influence my career plans.
2. I am aware of specific opportunities for exposure or visibility on the job.
3. The social events in my office are adequate to build a sense of community.
4. The work-related meetings in my office are adequate to build good working relationships.

A.4. Interpersonal trust

1. I trust my supervisors.
2. My supervisors trust me.
3. I trust my peers.
4. My peers trust me.

A.5. Adjustment to virtual work

1. All in all, I am satisfied with virtual work.
2. Virtual work allows me to perform my job better than I ever could when I worked in the office.
3. If I were now given the choice to return to traditional office environment (i.e. no longer telework), I would be very unlikely to do so.
4. Since I started working virtually, I have been able to balance my job and personal life.
5. Since I started working virtually, my productivity (e.g. sales orders, customer support) has increased.

References


