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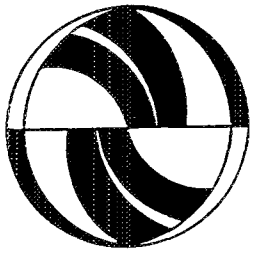

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The University of California
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The Impact of Gender, Occupation, and Presence of Children on Telecommuting Motivations and Constraints

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Accurate forecasts of the adoption and impacts of telecommuting depend on an understanding of what motivates individuals to adopt telecommuting and what constraints prevent them from doing so, since those motivations and constraints offer insight into who is likely to telecommute under what circumstances. Telecommuting motivations and constraints are likely to differ by various segments of society. In this study, we analyze differences in these variables due to gender, occupation, and presence of children for 583 employees of the City of San Diego. Numerous differences are identified, which can be used to inform policies (public or organizational) intended to support telecommuting. Most broadly, women on average rated the advantages of telecommuting more highly than men—both overall and within each occupation group. Women were more likely than men to have family, personal benefits, and stress reduction as potential motivations for telecommuting, and more likely to possess the constraints of supervisor unwillingness, risk aversion, and concern about lack of visibility to management. Clerical workers were more likely than managers or professionals to see the family, personal, and office stress-reduction benefits of telecommuting as important, whereas managers and professionals were more likely to cite getting more work done as the most important advantage of telecommuting. Constraints present more strongly for clerical workers than for other occupations included misunderstanding, supervisor unwillingness, job unsuitability, risk aversion, and (together with professional workers) perceived reduced social interaction. Constraints operating more strongly for professional workers included fear of household distractions, reduced social and (together with managers) professional interaction, the need for discipline, and lack of visibility to management. Key constraints present for managers included reduced professional interaction and household distractions. Lack of awareness, cost, and lack of technology or other resources did not differ significantly by gender or occupation. Respondents with children rated the stress reduction and family benefits of telecommuting more highly than did those with no children at home. Those with children were more likely than those without children to be concerned about the lack of visibility to management, and (especially managers) were more likely to cite household distractions as a constraint.

1. Introduction

Telecommuting is gaining increased recognition as an alternative work arrangement having potentially beneficial effects for the employer, employee, and society at large (see, e.g., Gray, Hodson, & Gordon, 1993). Accurate forecasts of the adoption of telecommuting are of interest to providers of equipment and services for home-based and remote work, and to public agencies promoting telecommuting for its social benefits (see, e.g., Handy & Mokhtarian, 1996). Accurate forecasts, in turn, depend on an understanding of what motivates individuals to adopt telecommuting and what constraints prevent them from doing so, since those motivations and constraints offer insight into who is likely to telecommute under what circumstances.

Telecommuting motivations are likely to differ by various segments of society. For example, conventional wisdom has suggested that telecommuting would be more attractive to women than men. Since working women still undertake a disproportionate share of domestic responsibilities (Tingey, Kiger, & Riley, 1996), the hypothesis is that the promise of telecommuting to save time and to offer greater flexibility would appeal even more strongly to women than to men (Gordon, 1976). A previous study of telecommuting adoption (Mokhtarian & Salomon, 1996a) found that indeed, females were significantly more likely to want to telecommute from home than males ($p = 0.0008$). However, preference within both groups was quite high (92% for women in the sample; 83% for men), raising the question of whether women and men wanted to telecommute for the same reasons or not.

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In the same study, preference for home-based telecommuting did not vary across major occupation groups: Eighty-eight percent of respondents in each of the manager, professional/technical, and clerical groups wanted to telecommute. Although the proportions of respondents wanting to telecommute are uniform across these groups, the question again may be asked as to whether there are significant differences among them in their reasons for wanting to telecommute—or, for that matter, not wanting to telecommute. For example, concerns that telecommuting would hinder professional development due to a reduction in workplace interaction may be more of a detriment to managers and professionals than to clerical workers (Olson & Primps, 1984).

Wanting to telecommute is one thing; actually being able to do so is quite another. Mokhtarian and Salomon (1996a) found that although 88% of their sample wanted to telecommute, only 11% were doing so. A variety of constraints can prevent a preference for telecommuting from being exercised, and the incidence and strength of these constraints is also likely to differ across demographic segments. Although women in their sample were more likely than men to prefer telecommuting, both genders were equally likely actually to be telecommuting. This suggests that constraints on the ability to telecommute are operating more strongly for women than for men. Conversely, there were no occupation differences in the preference to telecommute, but significant variations across occupation in the choice of telecommuting, with managers most likely and clerical workers least likely to be doing so. Thus, constraints are operating differentially for occupations as well.

Identifying differences such as these is the aim of this study. Specifically, we examine the extent to which telecommuting motivations and constraints differ significantly by gender and occupation. We primarily study six gender–occupation groups: Managers, professional/technical workers, and clerical workers separated by gender. More than 95% of the sample studied here fell into those three job categories. This result, plus the fact that several other telecommuting research projects have focused on the same three categories (see e.g., Hartman, Stoner, & Arora, 1991; Pratt, 1984), were motivations to limit the analysis to these occupations. For some variables, the presence of children in the household may be more important than gender. The sample size precludes a full three-way analysis of gender, children, and occupation, but the impact of presence of children is selectively analyzed and key significant results reported.

The remainder of this article is divided into five sections. The next section describes the data collected for this study, the variables defined for the analysis, and the analysis methodology, while also presenting some key socio-economic characteristics of the sample. Section 3 specifies a number of hypothesized gender and/or occupation differences in telecommuting motivations and constraints. Section 4 presents the results of statistical tests for motivations, and Section 5 does the same for constraints. The final section summarizes and discusses the key findings. Readers who desire only an overview of the results and their implications are invited to focus on the concluding section, especially Tables 6–8.

2. The Research Context

2.1. The Study, the Sample, and the Survey

This study is part of an ongoing research project devoted to modeling telecommuting preference and choice. Mokhtarian and Salomon (1994) proposed a conceptual model of telecommuting adoption in which the individual choice to telecommute is postulated to be a function of drives (motivations) and constraints. Motivations to telecommute are classified into five types:

- Work-related (e.g., to get more work done),
- family-related (to spend more time with family),
- leisure/independence-related (to have more time for self),
- travel-related (to reduce the time or stress of commuting), and
- ideological (to save energy and improve air quality through reducing travel).

Constraints on the ability to telecommute are classified into:

- External variables, including awareness-related, employer-related, and job-related, as well as
- internal (psychosocial) variables such as the desire for social or professional interaction, lack of self-discipline, risk aversion, and household distractions.

The absence (or sufficiently weak presence) of constraints is considered to be a necessary but not sufficient condition for telecommuting to be adopted—it must also be the case that one or more drives are present.

The motivation and constraint variables hypothesized to be important were empirically measured and many were found to be significant in quantitative models of telecommuting preference and choice (Bagley & Mokhtarian, 1997; Mannering & Mokhtarian, 1995; Mokhtarian & Salomon, 1996b, 1997). However, a thorough examination of how telecommuting motivations and constraints differ by gender and occupation has not been undertaken by the project before now. As referenced in Section 3, other studies have addressed gender and occupation differences in the perceptions of telecommuting on a limited basis, but to our knowledge the current article represents the most systematic and comprehensive empirical treatment of this subject to date. In particular, there is apparently little or no empirical work examining gender and occupation differences in the incidence of the external constraints described above.

For this article, the study sample consists of 583 useable responses to a 14-page self-administered questionnaire distributed to 1,428 employees of the City of San Diego in December 1992. The survey contained questions on:

TABLE 1 Advantages of telecommuting

Advantage statement	Factor
1. To have more time for myself	Personal benefits
2 To reduce the stress of commuting	Stress
3. To get more work done	Stress
4 To reduce the stress I experience in the main office	Stress, personal benefits
5 To make it easier to handle dependent (child or adult) care	Family
6. To have more independence	Personal benefits
7 To spend more time with my family	Family
8. To save money	Personal benefits
9 To make it easier to pursue educational or personal interests	Personal benefits
10 To help the environment by driving less	Stress
11. To have more control over my physical working environment.	Stress, personal benefits
12. To increase flexibility.	Personal benefits
13. To be able to work while temporarily disabled	Disability/parental leave
14. To be able to work while permanently disabled.	Disability/parental leave
15. To be able to work instead of taking parental leave.	Disability/parental leave, family
16. To keep working at this job after changing my residence	Relocation
17 To keep working at this job after my main workplace moved to another location.	Relocation

- Previous awareness of and experience with telecommuting,
- job characteristics,
- ability to telecommute,
- advantages and disadvantages of telecommuting,
- information on other possible choices to satisfy hypothesized lifestyle drives,
- attitudes toward telecommuting and issues related to lifestyle drives, and
- sociodemographic characteristics.

The questionnaire defined telecommuting as "working from home or from a center close to home, instead of commuting to a conventional work location." The questions relating to the ability to telecommute (based on job suitability, supervisor willingness, and personal desires) allowed seven frequency options ranging from "not at all" to "5 days a week" and "occasional partial days."

Mokhtarian and Salomon (1996a) discuss selection bias in the sample and its possible implications for the generalizability of reported findings. For the current study, selection bias means that the proportion of the sample in each study group is not necessarily representative of that group's presence in the population as a whole, but it may still be the case that the sample reasonably represents each group's perceptions of telecommuting. That is, female managers, say, may be underrepresented in the sample, but the female managers who are in the sample may be fairly representative of how the population of female managers views telecommuting (the exception is the sample of male clerical workers, which contains only 12 people).

On the other hand, it is true that the sample is biased toward higher-income and more secure workers (professional local government employees), which may affect the results. The fact that the single employer studied had a formal telecommuting program approved by upper management may also affect the results. The general population, for example, may possess constraints such as supervisor unwillingness, or concern about lack of visibility to management, to a greater degree than shown here. However, it is not necessarily the case that *relative differences* in the incidence of these constraints across gender or occupation groups are more pronounced in the general population than in the present sample.

2.2. *Variables Studied and Analysis Methodology*

This study focuses on the survey questions relating to telecommuting motivations and constraints. To measure motivations and many of the internal constraints, both of which are attitudinal variables, respondents were asked to rate on a four-point scale (not at all important, slightly important, moderately important, and extremely important) 17 advantages and 11 disadvantages of telecommuting. These characteristics of telecommuting were developed from the literature (e.g., DeSanctis, 1984; Katz, 1987) and from researcher judgment. "Other" advantages and disadvantages could also be specified by the respondent; these were recoded to listed attributes where possible, and otherwise not further analyzed here. After rating the characteristics on each list, respondents were asked to rank the top three advantages and disadvantages, respectively. Respondents were rating each attribute with respect to their perceptions of telecommuting for themselves. Hence, managers' views in particular should be understood to relate to telecommuting for their own situation and not for their staff.

The 28 intercorrelated attributes were factor analyzed together to reduce them down to nine (oblique) factors (Mokhtarian & Salomon, 1997). The 17 advantages loaded on five of these factors, which may be viewed as measuring potential drives or motivations to telecommute, whereas the 11 disadvantages loaded on the other four factors which constitute potential constraints on the desire and/or ability to telecommute. Tables 1 and 2 display the exact wording of the advantages and disadvantages listed in the survey, and

TABLE 2. Disadvantages of telecommuting.

Disadvantage statement	Factor
1. In general, I prefer the *social* interaction found at the conventional workplace	Workplace interaction
2. I prefer the *professional* interaction found at the conventional workplace	Workplace interaction
3. I would be concerned about my opportunities for visibility and career advancement	Management visibility
4. There is a risk that I would be viewed negatively by management	Management visibility
5. The main office is nicer/better equipped.	Office discipline
6. It's harder to get motivated to work, away from the main office.	Office discipline
7 It's too much trouble to remember what to take back and forth between work locations.	Office discipline
8. My commute trip is a useful transition between home and work.	Commute benefit
9 I use my commute time productively.	Commute benefit
10. My commute trip allows me to do errands on the way to or from work.	Commute benefit
11. Working at home may increase family conflicts.	Commute benefit

indicate the factor(s) on which each statement loaded most heavily.

The external constraints might be considered more objective rather than attitudinal, although their measurement was still based on respondent self-reports. The constraint variables shown in Table 3 comprise several different types:

- External constraints, generally measured through dichotomous variables but in one case (misunderstanding) measured through a factor score;
- alternate binary variables measuring the household distractions constraint (partially redundant with disadvantage statement 11 of Table 2, but the impact of that statement is attenuated within the factor on which it loads);
- the lack of discipline factor obtained from a section of the survey in which attitudes relevant to telecommuting were measured but not explicitly referred to as advantages or disadvantages of telecommuting; and
- the risk proneness statement from the same section of the survey.

It should be noted that some of these constraints can be measured in a variety of ways. For example, job unsuitability, supervisor unwillingness, and technology needs could have been defined on a polytomous rather than dichotomous scale. The particular variable definitions selected for discussion here represent a somewhat arbitrary choice made on the basis of simplicity of presentation, consistency with variables used in previous studies of the same data, and prior experience regarding which of several alternate formulations were preferable.

Section 4 analyzes demographic differences in the motivation variables, and Section 5 analyzes the constraint

TABLE 3. Other constraints analyzed.

Variable	Definition
Lack of awareness	A binary variable equal to one if the respondent had never heard of telecommuting before receiving the survey
Misunderstanding	A factor score based on statements such as "telecommuting is generally not appropriate for supervisors," "most telecommuters are women with child care responsibilities," and "telecommuting is the same thing as working from home"
Supervisor unwillingness	A binary variable equal to one if the supervisor is not willing to allow the employee to telecommute any amount
Job unsuitability	A binary variable equal to one if the employee's job is not suitable for telecommuting any amount
Technology needs	A binary variable equal to one if the employee needs to acquire or upgrade any equipment in order to be able to work from home
Resource needs	A binary variable equal to one if "don't have all the resources I would need" was given as a reason for not currently telecommuting
High cost	A binary variable equal to one if "it would cost me too much" was given as a reason for not currently telecommuting
Household distractions a concern	A binary variable equal to one if the respondent answered affirmatively to the question, "Would distractions from other household members be a concern if you worked from home?"
Unsuitable home environment	A binary variable equal to one if "my home environment is not suitable" was given as a reason for not currently telecommuting
Lack of discipline	A factor score based on responses to statements such as, "I have to admit I'm not very self-disciplined" and (loading negatively) "I'm basically a pretty organized person"
Risk proneness	The response on a five-point Likert-type scale (strongly disagree to strongly agree) to the statement, "I like to take risks when there is a chance of a good payoff"

TABLE 4. Demographic and other characteristics by gender and occupation

Variable	Indicator	Female[a]			Male[a]			Significance[b]	
		Mngr N = 24	Prof N = 143	Cler N = 142	Mngr N = 65	Prof N = 197	Cler N = 12	G	O
Age	Estimated mean[c]	39	37	39	43	40	43	.004	.001
Household size	Mean size	2.4	2.4	2.6	3.0	2.8	3.1	.004	N
Presence of children under 6	Percent having	13%	20%	16%	23%	24%	25%	.06	N
Presence of children 6–15	Percent having	29%	20%	26%	29%	19%	17%	N	.07
Presence of someone needing special care	Percent having	4%	0%	8%	0%	5%	0%	N	.01
Education	Mean category[d]	4.8	4.5	3.1	5.1	4.6	4.2	.000	.000
Household income	Estimated mean[c]	$53K	$55K	$41K	$66K	$57K	$40K	.000	.000
Years in present occupation	Mean	7.3	6.1	7.3	13.3	9.9	6.9	.000	.006
One-way commute length	Mean miles	10.3	13.7	12.4	14.1	13.1	6.7	N	N
Vehicles per driver	Mean	1.0	1.1	0.9	1.1	1.1	0.9	N	.000
Preference for (home-based) telecommuting	Percent preferring	96%	94%	89%	83%	84%	83%	.001	N
Choice of (home-based) telecommuting	Percent choosing	33%	18%	5%	20%	10%	8%	N	.000

[a] Some characteristics had missing data, never more than 74 cases out of 583.

[b] Significant p-values given for G (gender) and O (occupation); N denotes not significant.

[c] Mean calculated by estimating the value for each respondent to be the midpoint of the category checked on the survey.

[d] A value of 4 denotes completion of 4-year college, university, or technical school degree, and values above 4 denote the completion of additional graduate courses or degrees.

variables. The motivations and the internal constraints represented by the advantages and disadvantages, respectively, of telecommuting are analyzed in the same two ways: Through examining the individual advantages and disadvantages ranked as most important, and through analyzing the factor scores for the five advantage and four disadvantage factors. Importance ratings for the individual attributes were also examined, but the factor scores constitute composite ratings on those attributes that carry essentially the same information in a more compact form. The most important advantage and disadvantage variables are binary (equal to one if the respondent chose it as most important, zero otherwise), and hence Pearson chi-square tests were performed to determine if there were significant differences in the distribution of responses by gender and occupation separately, and (where appropriate) by occupation within each gender category and/or by gender within each occupation type. T tests were also conducted to check for significant differences in the mean response values within and across groups. On the other hand, the factor scores are continuous variables, and thus analysis of variance (ANOVA) methods were used to analyze them.

These two approaches are complementary. The most important advantage and disadvantage reported by an individual may likely be the strongest single indicators of his/her motivation to telecommute or not. However, the "most important" variables represent a forced choice: Some respondents may have dutifully recorded a most important advantage even when they did not consider that advantage (or any other) particularly important in absolute terms. Further, several variables may relate to a single underlying dimension, and the choice among them of the most important variable may be somewhat arbitrary. Factor scores, conversely, capture the intensity of perception: Individuals who did not consider a certain group of related advantages very important would have a low score on the factor derived from those advantages. It is just as important to understand how gender-occupation groups vary in the *degree* to which they value various potential characteristics of telecommuting as it is to know how they differ on what they consider the most important characteristics.

The remaining constraint variables are analyzed similarly. Continuous variables (factor scores) are analyzed using a two-factor ANOVA, and discrete variables are analyzed using chi-square tests on cross-tabulations of the variable by gender and occupation, both singly and each controlling for the other.

2.3. *Characteristics of the Sample*

A comparison of the six study groups on basic demographic characteristics is important for describing the sample and may offer some basis for interpreting the perceptual differences identified in Section 3. Table 4 summarizes several socio-economic characteristics by gender–job type category. For the continuous variables household size, one-way commute length, vehicles per driver, and years in present occupation, analyses of variance were conducted to simultaneously identify any gender and occupation, main and interaction effects. For the remaining (categorical) variables, Pearson chi-square tests were conducted for differences by gender and occupation separately. The p-values of these tests are reported in the final two columns of the table.

Four variables significantly distinguished between both gender and job type: Age, education, household income, and years of experience. On average, males were older than females in each occupation category. Similarly, for each job type, men had higher education levels and household incomes than women, with one exception: Female clerical workers reported household incomes slightly higher than

those of (the small sample of) male clerical workers. Finally, men had (on average, about 4) more years of experience in their present occupation than women, with the same exception.

The remaining variables differed significantly on, at most, one of the two dimensions of gender and job type. Male respondents

- generally had larger household sizes,
- more often had children under the age of 6, and,
- as discussed in the Introduction, less often wanted to telecommute.

Occupation differences were observed for

- presence of children ages 6–16 (with managers having them most often and professionals least often),
- presence of someone needing special care (occurring most often for the clerical workers),
- vehicles per driver (with clerical workers having the least at 0.9), and
- actual telecommuting (with clerical workers least likely to do it and managers most likely to do it).

It is perhaps surprising that proportionally more managers (24%) telecommute than professional workers (13%), but managers presumably have more autonomy than their staff, and may already themselves have been managed remotely to some degree before beginning to telecommute. In any case, it is clear from these data that whatever face-to-face interaction is required of managers can often be scheduled in such a way as to make telecommuting possible.

3. Research Hypotheses

We hypothesize a number of gender- and occupation-related differences in telecommuting motivations and constraints. Further, as this study is essentially exploratory, we systematically examine all potential effects of gender and occupation on the telecommuting motivation and constraint variables measured in this study, even when no prior strong hypothesis (or multiple competing hypotheses) may be apparent. The specific hypotheses implied by the discussion below, together with the results of the analysis presented in Sections 4 and 5, are summarized later in Tables 6 and 7.

3.1. Motivations to Telecommute

Several studies (e.g., Bielby & Bielby, 1988; Tingey et al., 1996) have indicated that working women still bear a disproportionate share of household responsibilities, and that this dual role is a source of considerable stress. This suggests that women are more likely than men to view telecommuting as a (partial, at least) solution to those types of pressures. Whether or not telecommuting succeeds as such a solution, is of course another question: Several researchers have noted that telecommuting may, in fact, increase role-conflict and stress, especially for women with child-care responsibilities, or at least not reduce it materially (Christensen, 1988; DuBrin, 1991; Olson & Primps, 1984; Shamir & Salomon, 1985). This represents a more sobering assessment of telecommuting compared to some earlier, rather optimistic, views. Gordon (1976), for example, suggested that, in addition to facilitating child care arrangements and reducing commuting, telecommuting might support the increased integration of women into the workplace through defusing sexual tension, and the "elimination of male-oriented practices" not well-suited to female managers and professionals still struggling to find a place in the corporate environment. Nearly a decade later, Risman and Tomaskovic-Devey (1985) more cynically noted that telecommuting may rather be used to reinforce traditional roles by purportedly making it easier for women to handle domestic responsibilities while working, yet simultaneously keeping them out of the career mainstream. In this study, however, we focus primarily on what advantages and disadvantages telecommuting is perceived to offer, not the degree to which reality accords with perception.

Among occupation groups, we hypothesize that clerical workers (who, in our sample as derived from Table 4, have the lowest education levels, the lowest average household incomes, and the highest rate of incidence of dependents needing special care) are more likely to see telecommuting as a solution to stress and as a way of spending more time with their families. Managers in our sample have the largest households, the highest incidence of older children and the second-highest incidence of young children among the three job types, but they also have the highest levels of education and household income. It is expected that the more affluent managers are more likely to balance work and family through hiring domestic help, and hence are less likely to value telecommuting as a solution for these types of pressures.

Olson and Primps (1984) found that males tended to telecommute for work-related reasons such as reducing distractions and improving the work environment, but in their study, gender was apparently heavily confounded with occupation (with professional workers tending to be male and clerical workers almost exclusively female). Since other studies have found that "when job status is controlled, work attitudes and career commitment are not gender-linked" (Pazy, Salomon, & Pintzov, 1996, p. 270; also see Bielby & Bielby, 1989; Lefkowitz, 1994), we hypothesize that the desire to telecommute to get more work done is strictly a function of occupation, and not of gender.

Olson and Primps also found that male professionals cited reduced stress as an advantage of telecommuting, due to "lack of interruptions," "avoidance of office politics," and "elimination of the stress of commuting." We expect at least the first two of those aspects not to be gender-specific (Duxbury, Higgins, & Irving, 1987; Newman, 1989). As for occupation effects, we expect that both professionals and clerical workers may experience office stress. We hypothesize that managers are less likely to be concerned about office stress as they have more control over their office

environments (however, it could also be argued that managers face greater stress because of their greater responsibility).

3.2. *Constraints on Telecommuting*

Lack of visibility to management and fears of the impact that might have on career advancement within the organization have been repeatedly identified as perceived drawbacks of telecommuting (e.g., Duxbury et al., 1987), although the empirical evidence (e.g., Riley & McCloskey, 1996; Tolbert & Simons, 1994) indicates that the reality is quite benign—at least for professional workers. We hypothesize, in keeping with Olson and Primps' (1984) results, that lack of visibility is more likely to be perceived as a disadvantage by professional/technical workers than by clerical workers. And although managers may be equally (or more) concerned with career advancement as professionals, it may be expected that they themselves are already managed remotely to some extent, and therefore that telecommuting is less of a noticeable departure from the status quo for them. We further hypothesize, in view of the considerable attention paid to the "mommy track" and the "glass ceiling" for women (e.g., Hall, 1989; Schwartz, 1989) that women are more likely to be concerned about lack of visibility than men (this was found empirically by Pratt, 1984).

Similarly, in this context, we expect risk aversion to be expressed more strongly by professional workers and by women. We also expect women to be more likely to perceive their supervisors as unwilling to let them telecommute. We expect clerical workers to be most likely of the three groups to cite supervisor unwillingness as a potential constraint; this could be partly due to job unsuitability, which we also expect to be considered highest for clerical workers.

Another frequently-cited disadvantage of telecommuting is the social and professional isolation associated with it (although it should be noted that such isolation is primarily an issue for high-frequency telecommuting—often associated with clerical workers doing routine data entry work at home—rather than for the 1-or-2-day-a-week levels associated with much present-day telecommuting by professional workers). Salomon and Salomon (1984, p. 20), citing an earlier study (Herzberg, Mausner, & Peterson, 1957), indicate that "[t]he social interaction aspect [of the job] was found to be more important among workers of routine duties and those holding jobs that provided little satisfaction from the work itself," whereas "[t]he social role of the workplace is of less importance in managerial and professional jobs. Workers of this type ranked achievement, advancement, and the work itself as factors that contribute most to job satisfaction." Thus, it can be hypothesized that clerical workers are more likely to be concerned about a loss of social interaction with telecommuting, whereas the other two groups may be more likely to be concerned about professional interaction. However, Shamir and Salomon (1985) suggest that workers of all types may value the social relationships of the workplace, which may negate the first part of the hypothesis (also see Duxbury et al., 1987).

In view of the multiple roles undertaken by women, we expect them to value the utility of the commute trip (in terms of serving as a boundary or transition between home and work, the ability to use the commute productively to run errands, and so on [Salomon & Salomon, 1984]) more highly than men. Hence, we hypothesize that women are more likely than men to see the various benefits from commuting as disadvantages of telecommuting. Also because of the multiple demands on women, we hypothesize that they will be less likely than men to report a lack of discipline.

4. Differences in Motivations to Telecommute

4.1. *"Most Important" Advantages*

For simplicity of exposition, we focus on the top six attributes most often cited as the most important advantage. These six attributes were together cited by 69% of the overall sample:

- Get more work done (most important to 23.8% overall),
- have more time for myself (11.7%),
- reduce commuting stress (10.8%),
- reduce office stress (8.7%),
- help the environment by driving less (7.9%), and
- more flexibility (6.0%).

None of the remaining 11 advantages were most important to more than 5.2% of the sample. Collectively, these variables indicate that stress, personal benefits, and travel/environmental issues are likely to be important drives in an individual's telecommuting preference formation.

Figure 1 portrays, for each advantage, the fraction of respondents in each group citing that attribute as most important. Again for simplicity, only those attributes which differed significantly by either gender or occupation are shown. In interpreting the results, it is important to recall that the size of the male clerical worker sample is very small (N = 12), and thus, the fraction of respondents in this group choosing a particular attribute may not be reliable.

Chi-square tests on the variable *get more work done* found a significant gender difference ($p = 0.001$), with 30% of men but only 18% of women citing it as most important. However, as shown in the figure, the percentages of men and women within each occupation group choosing it as most important were very similar. In fact, within the two job types having a significant number of male workers, chi-squared tests show no significant gender differences (manager p-value = 0.92; professional p-value = 0.70). This result is consistent with previous studies cited in Section 3.1.

Although there are no significant differences between gender *within* occupation, there are significant differences *across* occupations without regard to gender ($p = 0.000$).

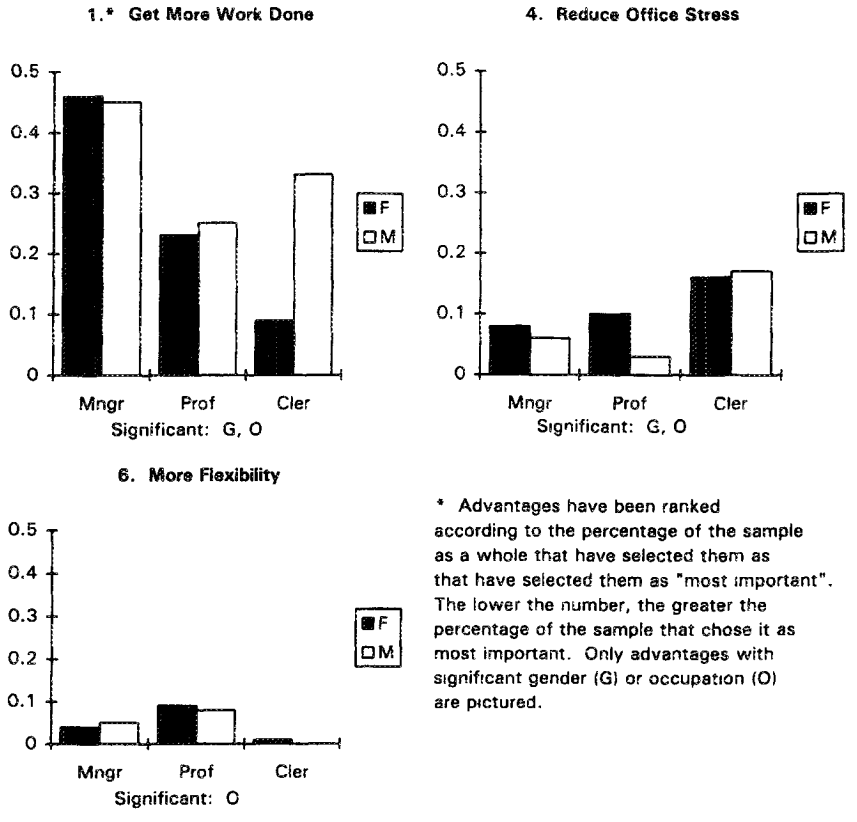


FIG. 1. Fraction of respondents in each group choosing telecommuting advantage as most important.

Nearly half of all managers cited getting more work done as the most important advantage of telecommuting. Presumably managers are subject to many interruptions that can be more readily controlled in a telecommuting environment. Nearly a quarter of the professional/technical workers group cited this attribute as most important. Overall, the responses for this variable support hypothesis O1 of Table 7.

The second-most cited variable, *more time for myself,* can be categorized as a personal benefit of telecommuting. As such, it could be postulated (see hypothesis G2 of Table 6) that women would more often than men select this advantage as most important. However, chi-squared tests did not show any distinctions within gender ($p = 0.99$) or occupation ($p = 0.97$). *Reducing the stress of commuting* is another advantage of telecommuting that could potentially be more attractive to women (see G3). Here too, however, there were no significant differences within gender ($p = 0.3$) or occupation ($p = 0.3$) in selecting this advantage.

The next variable, *reducing office stress,* was significantly more important to women than men (13% of the women chose it vs. only 4% of the men; $p = 0.000$), in support of hypothesis G3. Further, female clerical workers were more likely to choose it than females in the other two job types, indicating that this is the primary group perceiving reduced office stress to be a key advantage of telecommuting (pair-wise t tests across occupations showed significantly different means between clerical workers and the other two groups, p-values < 0.02). Of the three job types, clerical workers may have the least control over their working conditions, and consequently, may feel more office stress. Stress was also differentially important to female professionals however; as Figure 1 shows, they were more than four times as likely as their male counterparts to cite this advantage ($p = 0.002$ for chi-squared test of gender difference within the professional workers group).

For the variable *help the environment by driving less,* no chi-squared or t test showed a significant difference among occupations or gender for $p \leq 0.05$, suggesting that this particular advantage is about equally important across the six study groups. The last variable, *more flexibility,* showed significant occupation differences ($p = 0.006$), with professionals (8.5% of that group) most likely to cite it, managers next most likely (4.5%), and clerical workers least likely (1.3%).

It is interesting to note that the family-related advantages of telecommuting were separately not among the top six. Two such advantages combined, however, were most important for more than 10% of the overall sample (which would have placed family issues fourth in the ranking): *Spend more time with my family* (5.1%) and *easier to handle dependent care* (5.0%). There were no significant gender or occupation differences for the variable "spend more time with family." The dependent care variable, on the other hand, showed significant differences for both gender ($p = 0.001$) and occupation ($p = 0.00001$).

Clerical workers (12.3%) were five and 10 times as likely as professional (2.6%) and managerial (1.1%) workers to cite this advantage as most important, in support of O2 and consistent with the evidence in Table 4 that this group most often had dependents needing special care. Women (7.8%) were four times as likely as men (1.8%) to cite dependent care as the most important advantage, in support of hypothesis G1. This is especially telling since, as can be derived from Table 4, one-third more men (24%) in the sample had children under age 6 than did women (18%), and similar proportions of men (21%) and women (23%) had older children living at home. Interestingly, however, within occupation groups there were no significant gender differences, although cell sizes were generally too small to warrant emphasizing this outcome.

The difference in response patterns between the two family-related advantages of telecommuting is suggestive. It may well be the case that men and women are equally likely to see their family role in terms of spending time together, whereas women are more likely than men to see their family role in terms of caring for dependents. This finding illustrates the need to carefully define a "family" variable in this type of context.

A *composite variable* was created to combine the two family variables, and gender/occupation differences were tested for in the tendency to cite *either* variable as the most important advantage. The results for this composite variable roughly parallel those for the dependent care variable: There were moderately significant gender ($p = 0.06$) and very significant occupation ($p = 0.0006$) differences, in the same directions as before but with smaller contrasts between groups. Within occupation, there were no significant gender differences, although some cell sizes remained rather small.

Taken together, these results can be considered to offer only mixed or partial support for the hypothesis (G1) that women are more likely than men to cite family reasons as advantages of telecommuting.

4.2. Advantage Factor Scores

4.2.1. Gender and occupation effects

For the gender–occupation groups in this study, a two-factor analysis of variance (ANOVA) model was used to identify, for each factor score, significant gender main effects, occupation main effects, and interaction effects. (Note the two different, but equally conventional in separate contexts, uses of the word "factor"). Testing for a gender main effect compares males and females on each factor score to determine if the mean scores differ significantly by gender. Similarly, testing for an occupation effect examines whether the mean factor scores differ across the three job types. Testing for an interaction effect shows whether any change across gender type varies by occupation type (or conversely).

Plots of the mean factor scores for telecommuting advantages by gender and occupation are displayed in Figure 2. Note that factor scores are standardized, so negative values simply indicate a score that is less than the overall sample mean score for that factor. Although visually there may appear to be some interaction effects due to scale exaggeration, none were statistically significant.

Starting with the advantages, a couple of interesting observations emerge from looking at the five factors together. First, gender effects are significant in every case: Specifically, for every factor and within every occupation group, mean scores for women exceed those of men. Evidently, the potential advantages of telecommuting are on average more salient to women than to men, which helps explain why women are significantly more likely to want to telecommute and which also generally corroborates hypotheses G1–G3. This result is consistent with findings of Mahmassani, Yen, Herman, & Sullivan (1993). However, a scale response bias could also be hypothesized, in which women are more likely than men to respond positively in general. Examination of the survey research literature did not identify any other evidence for such a response bias, but the fact that, in a different context, a similar result was observed and the same hypothesis advanced (Handy, 1996) is, at least, suggestive.

Second, in general for both women and men (but more strongly for men), managers have the lowest, professional/technical workers the next highest, and clerical workers the highest mean factor scores. These occupation effects are significant for only two of the five factors, but again they are consistent with the hypothesis that telecommuting will appeal the most to those who have a great deal of stress and the least amount of control over various aspects of their lives (see O2–O4).

Turning to the *personal benefits* factor specifically (which, as shown in Table 1, is based on attributes such as having more time for self, and increasing independence, control, and flexibility), the ANOVA results show that both gender and occupation main effects are significant (both p-values = 0.000). Women rated that characteristic of telecommuting much more highly than men, and clerical workers found it much more important than the other occupations. This finding supports hypotheses G2 and O3.

Only the gender effect was significant for the two family-related factors, *disability/parental leave* ($p = 0.05$) and *family* ($p = 0.000$). As noted, women on average rated these factors more highly than men, indicating that they perceive the ability to balance work and family as a valuable advantage of telecommuting (unambiguously supporting hypothesis G1, in contrast to the case for the most important advantage analysis). For the *relocation* factor, both gender ($p = 0.001$) and occupation ($p = 0.000$) effects were significant, with clerical workers placing the highest importance on the ability of telecommuting to allow them to continue to work in case of job or residential relocation. This is a natural result, since a clerical worker's job may well be most vulnerable to either type of relocation.

The last advantages factor, *stress*, had only a significant gender effect ($p = 0.000$). Although an interaction effect is

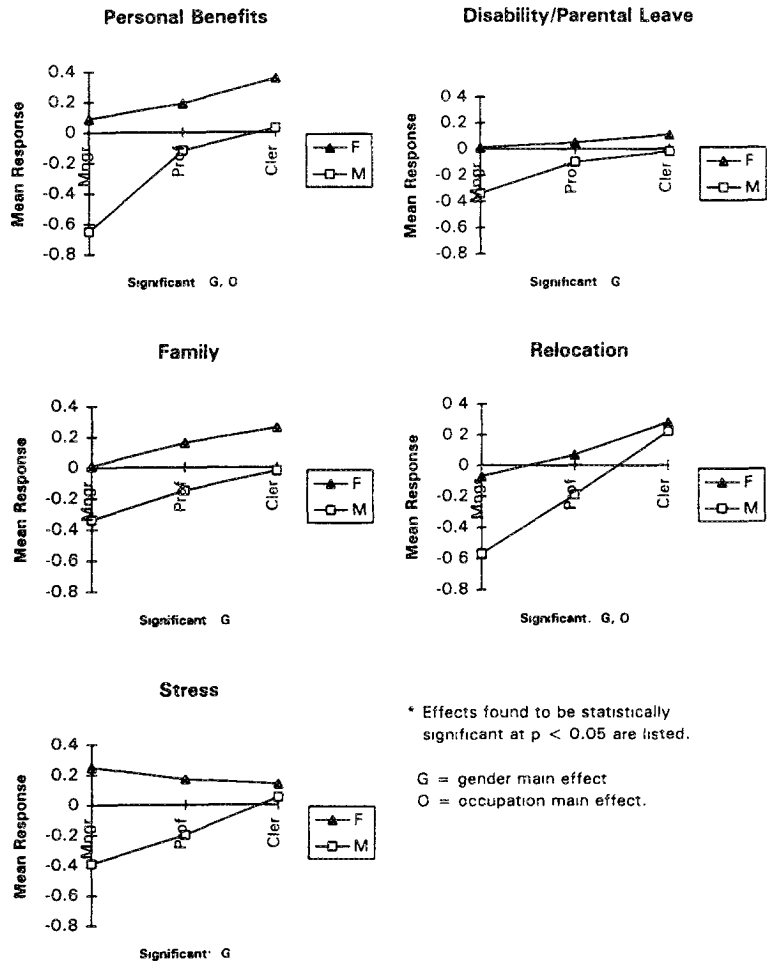


FIG. 2 Plots of mean factor scores for telecommuting advantages by gender and occupation.*

not significant, it is striking that males show a clear progression of increasing mean scores from managers (for whom reducing stress is not perceived to be an important advantage of telecommuting) to professional/technical workers, to clerical workers (in weak support of hypothesis O4). For females, on the other hand, the average scores across all three job types were quite similar. Either male managers do not experience as much stress as their female counterparts, or they do not see telecommuting as an answer to the stress they do experience, or both.

4.2.2. *Presence of children effects*

As indicated in the Introduction, for some motivation and constraint variables, the presence or absence of children might have an important impact. It may be that some of the gender effects seen here are actually interaction effects of gender with children. Conversely, it may be the case that some effects which do not differ significantly across gender alone may differ depending on the presence or absence of children, or on a gender–children interaction. There may be children–occupation interaction effects as well. In a large sample, a three-factor ANOVA would be the appropriate way to simultaneously account for the effects of all three demographic variables on a continuous dependent variable such as a factor score. In this sample, however, such an analysis would be unreliable due to small cell sizes in such categories as male clerical workers with children, and female managers with children (see Table 5 for a crosstabulation of these three variables). Hence, we focus on two-factor analyses of the presence of children with gender and occupation separately. For the results presented here, *presence of children* is defined as a dichotomous variable equal

TABLE 5. Crosstabulation of gender, occupation, and presence of children

	Children under 16				
	No		Yes		
	Female	Male	Female	Male	Total
Manager	16	37	8	28	89
Professional	96	128	47	69	340
Clerical	92	8	50	4	154
Total	204	173	105	101	583

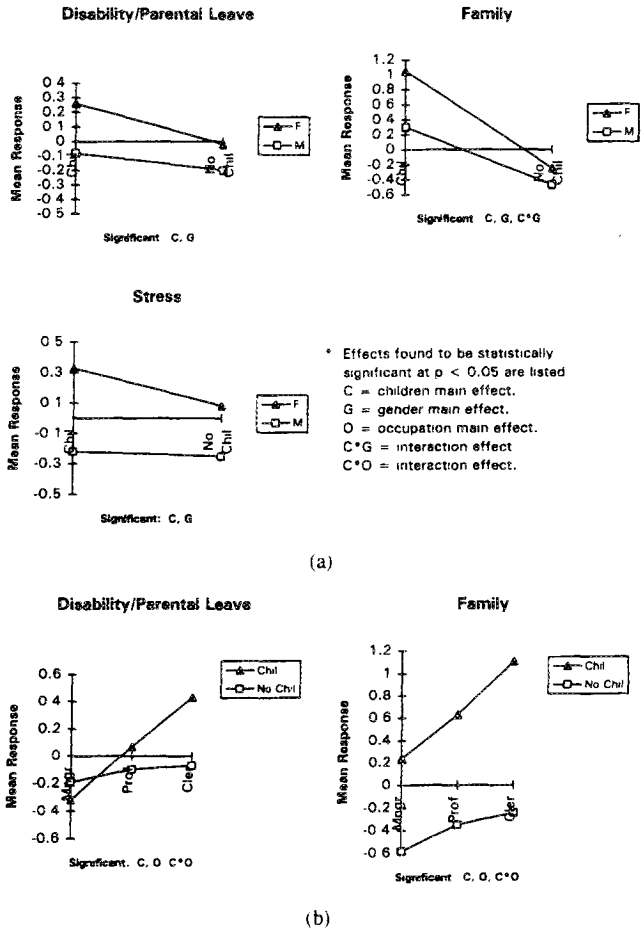


FIG. 3. **a:** Mean responses for telecommuting advantages by children and gender. **b:** Mean responses for telecommuting advantages by children and occupation.*

to one if the respondent has any children under age 16 living at home. Other analyses were conducted with a variable indicating the presence of children under age 6, with similar results.

For the advantage factor scores already discussed, the presence of children could be hypothesized to affect all of them. In fact, significant effects were found for three of the five advantage factors. The *personal benefits* factor score exhibited only a weak children effect ($p = 0.1$), despite the hypothesis that the independence and increased time for self afforded by telecommuting would be valued more highly by those with children. Similarly, no significant children effects were found for the *relocation* factor score ($p = 0.15$), despite the hypothesis that the presence of children would increase locational inertia and hence increase the salience of this advantage of telecommuting. Figures 3a and 3b illustrate mean factor scores by gender–children group and by occupation–children group, respectively, for the factors exhibiting a significant children effect.

From Figure 3a, two observations emerge. (a) Those with children, not surprisingly, tend to value the *disability/parental leave, family,* and *stress reduction* advantages of telecommuting more highly than those without (p-values 0.000–0.04). (b) As discussed earlier, women value all three advantages more highly than men, and here that is shown to be true whether or not there are children present. However, it can be seen that the mean scores for women without children tend to approach those for men without children, although the interaction effect is statistically significant in only one case, family.

From Figure 3b, it can be seen that the two-way ANOVA of children and occupation identifies occupation main effects ($p = 0.02$ for *disability/parental leave; p* = 0.000 for *family*) that did not appear in the ANOVA for gender and occupation discussed in Section 4.2.1. A children–occupation interaction effect is also significant for the *disability/parental leave* ($p = 0.04$) and *family* ($p = 0.01$) variables. In both cases, when children are not present, all three occupations logically have similar (and negative) mean scores, but in the presence of children, clerical workers value both advantages most highly of the three groups, and managers value them least highly. This offers further and more specific support to hypothesis O2: That is, clerical workers *with children* are more likely to cite family reasons as advantages of telecommuting.

5. Differences in Constraints on Telecommuting

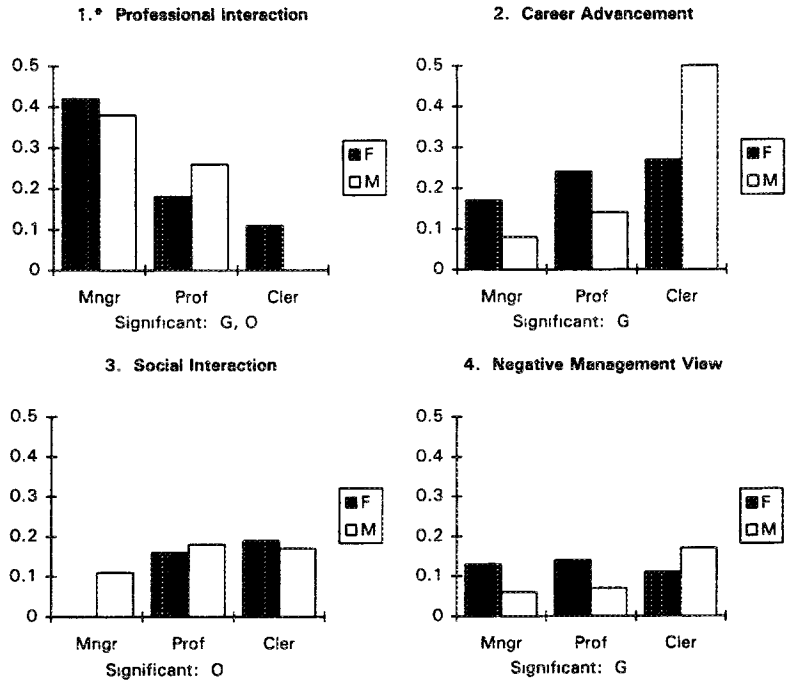
5.1. *"Most Important" Disadvantages*

Turning to the potential constraints on telecommuting, we first examine the most important disadvantage variables. The top six disadvantage variables were collectively cited as most important by 84% of the overall sample:

- Professional interaction (22.1%),
- career advancement (20.1%),
- social interaction (16.3%),
- negative management view (9.9%),
- better main office (9.1%), and
- motivation (6.2%).

None of the remaining five disadvantages were most important for more than 4% of the sample. Taken together, these results suggest that workplace interaction, management visibility, and office discipline are important constraints in an individual's telecommuting preference formation. For those attributes which differ significantly by gender or occupation (namely, the first four of the six), Figure 4 shows the fraction of respondents in each group citing that attribute as most important.

Males (28%) were significantly more likely than females (17%) to report *reduced professional interaction* as the most important disadvantage of telecommuting ($p = 0.001$). However, it is clear that some women also feel this disadvantage is powerful, as the highest selection percentage (42%) of any one group came from the female managers. In terms of occupations, managers were much more likely to choose this disadvantage as most important ($p = 0.000$), partially confirming hypothesis O5. Fully 39% of the man-



* Disadvantages have been ranked according to the percentage of the sample as a whole that selected them as "most important". Only disadvantages with significant gender (G) or occupation (O) differences are pictured.

FIG. 4 Fraction of respondents in each group choosing telecommuting disadvantage as most important.

ager group cited this variable (by far the most-frequently-selected disadvantage for that group), compared to 23% of professionals and 10% of clerical workers. Similarly, a related disadvantage of telecommuting, *reduced social interaction*, also varied significantly across occupations (chi-squared p-value = 0.06), although not across genders. Interestingly, clerical (19%) and professional (17%) workers were about equally likely to cite this variable (t test $p = 0.7$), and both groups were significantly more likely than managers to do so (t test p-values of 0.01 and 0.008, respectively). Thus, as seen from the data, both females and males, and both professional and clerical workers, rated social interaction equally highly, which is broadly consistent with the literature cited in Section 3.1. This supports and modifies hypothesis O6.

Career advancement and *negative management view* were related disadvantages collectively chosen as most important by nearly a third of the sample. Both were notably more important to women (p-values < 0.03). Women (38%) were almost twice as likely as men (21%) to cite one of these two variables as the most important disadvantage, corroborating hypothesis G4. Lefkowitz (1994) found that "the importance of advancement" was one of only two job-related variables that women rated higher than men. The large difference between men and women in this area seems to point to a current corporate culture that is perceived by women to be biased towards male success.

A *better main office* and *motivation*, two disadvantages dealing with office discipline, were selected as most important by 15.3% of the sample. This result suggests that office discipline issues represent an important area that individuals consider in their telecommuting preference formation. However, as responses were not significantly different among groups, office discipline disadvantages are apparently valued similarly across genders and occupations.

It is interesting to note that the three variables most closely associated with benefits of commuting (see disadvantage statements 8–10, Table 2) did not have significantly different distributions across gender–occupation groups, and in fact, collectively only accounted for 5.0% of the choices for most important disadvantage. Thus, there is no support for hypothesis G5 among the most important rankings of this sample.

5.2. *Disadvantage Factor Scores*

Turning to the disadvantage factor scores, plots of the mean scores by gender and occupation for the three factors exhibiting significant effects are displayed in Figure 5. It is first observed that the systematic overall patterns noted for the advantage factors do not appear here. Gender effects are significant for only one of the factors, whereas occupation is significant for three.

The *office discipline* factor comprises attributes relating to problems associated with working away from the main office, such as having the right equipment, materials, and motivation. Self-motivation and self-discipline are often identified as characteristics of successful tele-

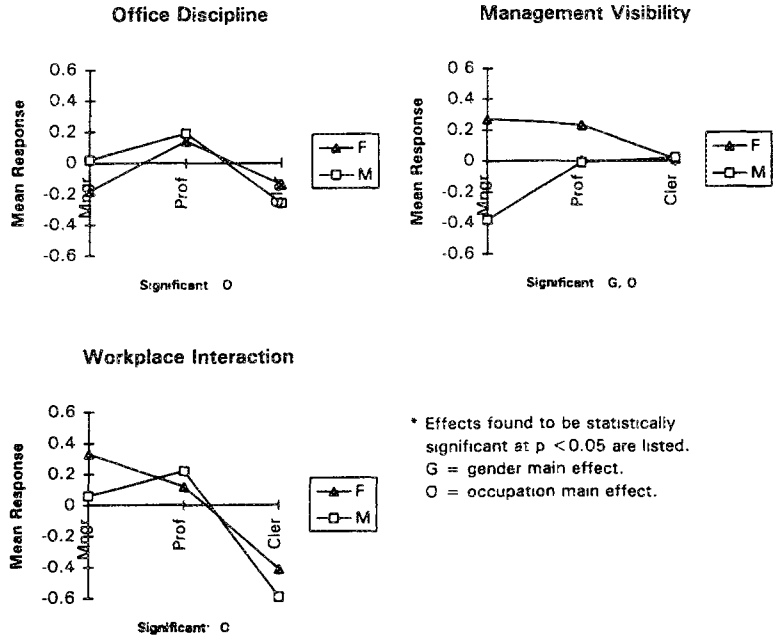


FIG. 5. Plots of mean factor scores for telecommuting disadvantages by gender and occupation.*

commuters (e.g., Katz, 1987). This factor displays a significant occupation effect (p = 0.003), with professionals scoring more highly on this disadvantage of telecommuting than the other two groups. Professional/technical workers may have a greater need for access to sophisticated and expensive work tools (such as technical manuals and lab equipment), and their jobs may in some ways be the least routine (and, therefore, perhaps demanding more motivation to undertake outside the traditional office environment).

Management visibility, having both gender (p = 0.000) and occupation (p = 0.004) effects significant, is the only disadvantage factor for which gender is significant. The mean factor scores for women were higher than those for men, showing once again that women feel more strongly that telecommuting could negatively impact their careers (hypothesis G4). As expected, the male managers had the lowest mean factor score, indicating that they are more confident that telecommuting would not hinder their job advancement opportunities. The female clerical workers had the lowest mean factor score of the female occupation groups. It may be the case that female managers and professionals are more career-oriented than female clerical workers, and thus more concerned about being viewed positively for promotions.

Workplace interaction had a significant occupation effect (p = 0.000). Clerical workers perceived the loss of interaction at the workplace to be less important than did professionals and managers. (The fact that the factor combines both social and professional interaction makes the relationship of this result to hypotheses O5 and O6 somewhat problematic). Rather, it is the female managers who score most highly on this factor. Overall, it appears that workplace interaction is important to both professionals and managers, which is consistent with the literature (Shamir & Salomon, 1985).

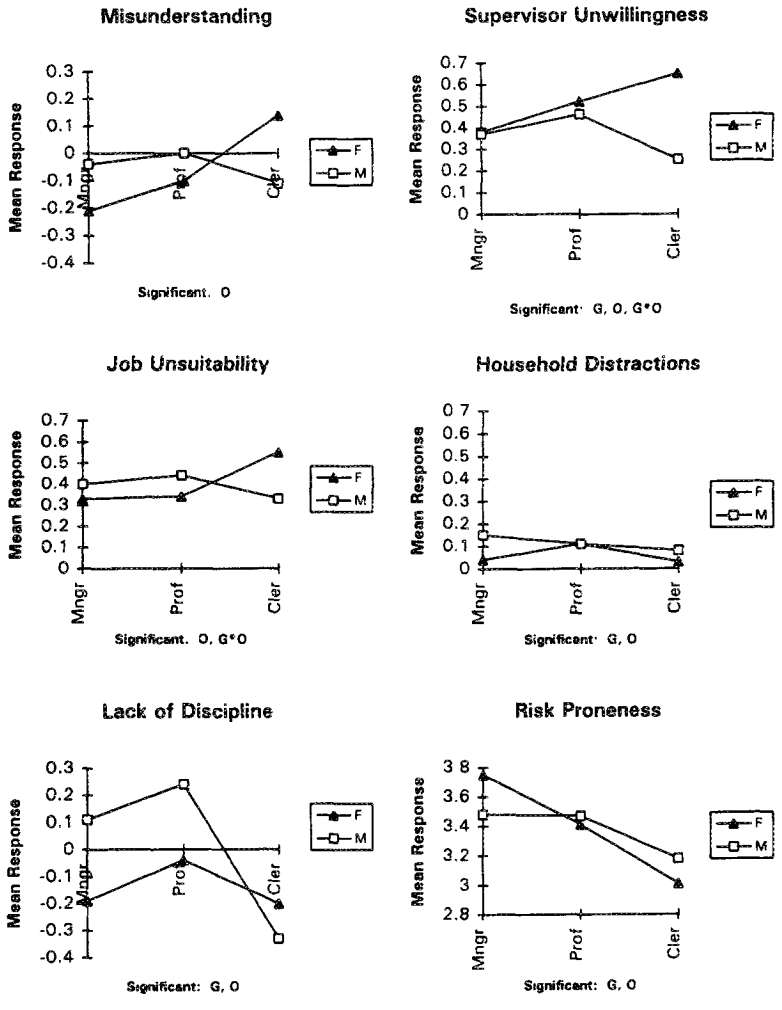
The only factor without a significant effect was the telecommuting disadvantage *commuting benefit* (p-values = 0.5 for gender and 0.4 for occupation). Thus, there is no support for hypothesis G5 in this sample. As we have seen here and elsewhere (Mokhtarian & Salomon, 1997) that women have higher scores on both general stress (analyzed here and containing some aspects of commute stress) and a specific commute stress factor (derived from attitudinal statements in another section of the survey), it may be the case that the negative aspects of the commute tend to outweigh the positive aspects in women's minds.

5.3. Other Constraints

Of the eleven other constraint variables listed in Table 3, five showed no significant differences by either gender or occupation: *Lack of awareness, technology needs, resource needs, high cost,* and *unsuitable home environment.* Figure 6 portrays mean values by gender–occupation group for each of the other six variables. We discuss each variable in turn.

Scores on the *misunderstanding* factor exhibited no significant differences by gender, but were different by occupation (ANOVA main effect p = 0.03). Clerical workers had the highest level of misunderstanding and managers the lowest. This constraint can be relatively easily mitigated through proper marketing of telecommuting, but, while in effect, may prevent some people from telecommuting who otherwise could.

The *supervisor unwillingness* variable differed by both gender and occupation, with some interaction effects. As



* Effects found to be statistically significant at $p < 0.05$ are listed.
G = gender main effect.
O = occupation main effect.
G*O = interaction effect.

FIG. 6. Mean values on other constraint variables by gender and occupation.*

expected (hypothesis G8), overall, women were more likely than men (57.0 vs. 42.7%) to possess this constraint (chi-squared $p = 0.0006$). Within occupations, however, this gender difference was significant only for clerical workers ($p = 0.006$); for managers and professional workers, supervisor unwillingness was about equally strong for women and men. Looking at occupations overall, in support of hypothesis O9, clerical workers were most likely (61.7%) and managers least likely (37.1%) to report unwilling supervisors (chi-squared $p = 0.0007$). Within gender, however, this occupation difference was significant only for women ($p = 0.01$); there were no significant differences in supervisor unwillingness across occupation for men ($p = 0.2$).

Overall, *job unsuitability* did not differ significantly by gender, with about 43% of respondents in both groups reporting the presence of this constraint. The significant (chi-squared $p = 0.01$) occupation effect supports hypothesis O10: Clerical workers were more likely to view their jobs as unsuitable (53.2%) than the other two job types (38–40%). Again, however, within gender this occupation difference was significant only for women ($p = 0.0008$).

Concern about *distractions from household members* exhibited gender and occupation differences. Women were less likely (6.8%) than men (12.0%) to be concerned about this issue (chi-squared $p = 0.03$), perhaps because they may have already integrated their home and work lives to a greater extent than men. Clerical workers (3.2%) were much less likely than the other two job groups (11–12%) to be concerned about household distractions ($p = 0.01$), perhaps because their work may in general be more routine than that of the other two job types.

Lack of discipline exhibited both gender (ANOVA $p = 0.001$) and occupation ($p = 0.02$) effects. Corroborat-

ing hypothesis G6, men tended to have higher scores on the lack of discipline factor than women. Interestingly, in terms of occupations, professional workers rated themselves as having the least discipline (highest score) on average, and clerical workers rated themselves as being the most disciplined.

Risk proneness also exhibited both effects. As hypothesized (G7), women were less likely (45.1%) than men (58.3%) to agree or strongly agree with the statement about liking to take risks (chi-squared $p = 0.007$). Among occupations ($p = 0.00004$), managers tended to be most risk prone (64.8% agreement), professional workers next most (56.2%), and clerical workers least (32.5%). These results offer partial support for hypothesis O8.

5.4. Presence of Children Effects

Among the constraint variables, commuting benefit, management visibility, supervisor unwillingness, household distractions, unsuitable home environment, lack of discipline, and risk proneness were tested for presence of children effects. The continuous variables were analyzed using two-factor ANOVAs for gender–children and occupation–children, respectively. For the discrete variables, "main" children effects were identified through a chi-square test on the crosstabulation of the dependent variable (e.g., supervisor unwillingness) by children. "Interaction" effects were qualitatively identified by noting where sample proportions in each cell of the children-by-[dependent variable] crosstabulation differed substantially by gender or occupation, in turn. Of the variables tested, *commuting benefit* and *lack of discipline* were found to have no significant children effects (although commuting benefit had a weak effect at $p = 0.06$, in the expected direction; that is, those with children tended to rate the benefits of commuting more highly). Mean values of the remaining variables by gender–children group and by occupation–children group (where there are significant children effects) are shown in Figures 7a and 7b, respectively.

Turning first to the *management visibility* factor scores, a striking result is seen. Across both genders and all three occupation groups, those with children are significantly more concerned about their visibility to management than those without (children p-values = 0.000 for both gender and occupation ANOVAs). Interestingly, men with children are slightly more concerned about their visibility to management than women without children. These results suggest a fear that those with children who ask to telecommute may be viewed by management as having a lower commitment to work, and hence, may have a higher likelihood of being passed over for promotion or for challenging assignments. In particular, fear of a "daddy track" is suggested. The gender and occupation main effects previously seen in Section 5.2 remain significant here as well, meaning, for example, that the greater concern of women over this issue does not apply just to working mothers.

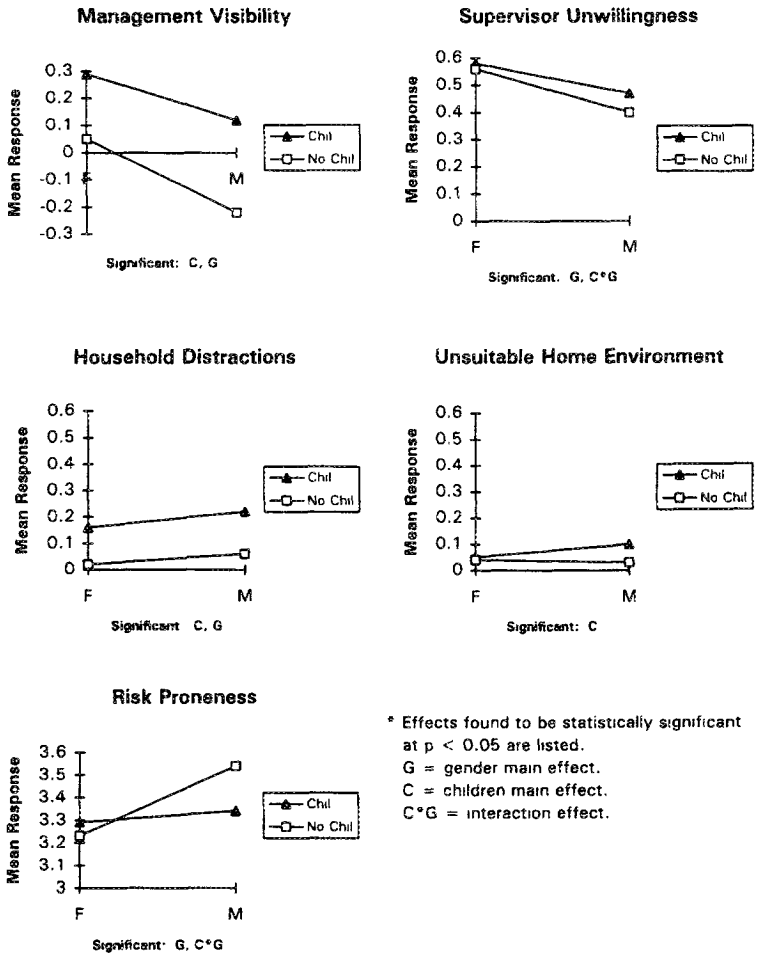
The *supervisor unwillingness* variable shows no significant "main" children effect (chi-squared $p = 0.4$), but appears to have some gender–children and occupation–children interaction effects. When children are present, both genders, but especially men, are more likely to report supervisor unwillingness than when there are no children (46.5% of men with children, but only 40.5% of men without, cite this constraint). Similarly, when children are present, supervisor unwillingness is quite high for clerical workers (66.7%), moderate for professionals (53.4%), and low for managers (27.8%), whereas without children, supervisor unwillingness is more evenly distributed across occupations (59.0% for clerical workers, 46.0% for professionals, and 43.4% for managers). These results hint further at a perceived management barrier to mixing work and family through telecommuting.

The *household distractions* variable shows the expected result that those with children are much more likely than those without children to be concerned about this issue (18.9% of those with children report this constraint, compared to 4.0% of those without, chi-squared $p = 0.00000$). These proportions do not vary substantially within gender, but do vary within occupation. In particular, for managers, 27.8% of those with children cite this concern, compared to just 1.9% of those without. Similar results are apparent for the *unsuitable home environment* variable ("main effects" chi-squared $p = 0.04$).

Finally, the *risk proneness* variable also showed no significant "main" children effects, but appeared to exhibit some interaction effects. Where children were present, men and women were about equally risk prone (51.5 and 47.1%, respectively, agreement with liking to take risks, chi-squared $p = 0.6$). On the other hand, without children, men (62.3%) were much more risk prone than women (44.0%, $p = 0.005$). Although having children might in itself be viewed as a major risk to some, it would be natural for the presence of children to reduce risk-taking behavior in other areas of life. Interestingly, however, the occupation results present a somewhat different twist. Managers with children tended to be *more* risk prone (66.7%) than those without (63.4%, chi-squared $p = 0.02$). Professionals with children tended to be *less* risk prone than those without (50.9% vs. 59.0%), but the difference was not significant ($p = 0.3$). There was also no significant difference ($p = 0.1$) in risk proneness for clerical workers with children (33.9%) and those without (31.6%).

6. Conclusions

This study has identified numerous gender- and occupation-related differences in telecommuting motivations and constraints. Most broadly, women on average rated the advantages of telecommuting more highly than men—both overall and within each occupation group. Telecommuting appears to appeal more strongly to women as a solution to problems they face, although it is worth pointing out again that telecommuting was highly desirable to the men in this



(a)

FIG. 7. **a:** Mean values on constraint variables by children and gender. **b:** Mean values on constraint variables by children and occupation *

sample as well (preferred by 83% of men, compared to 92% of women).

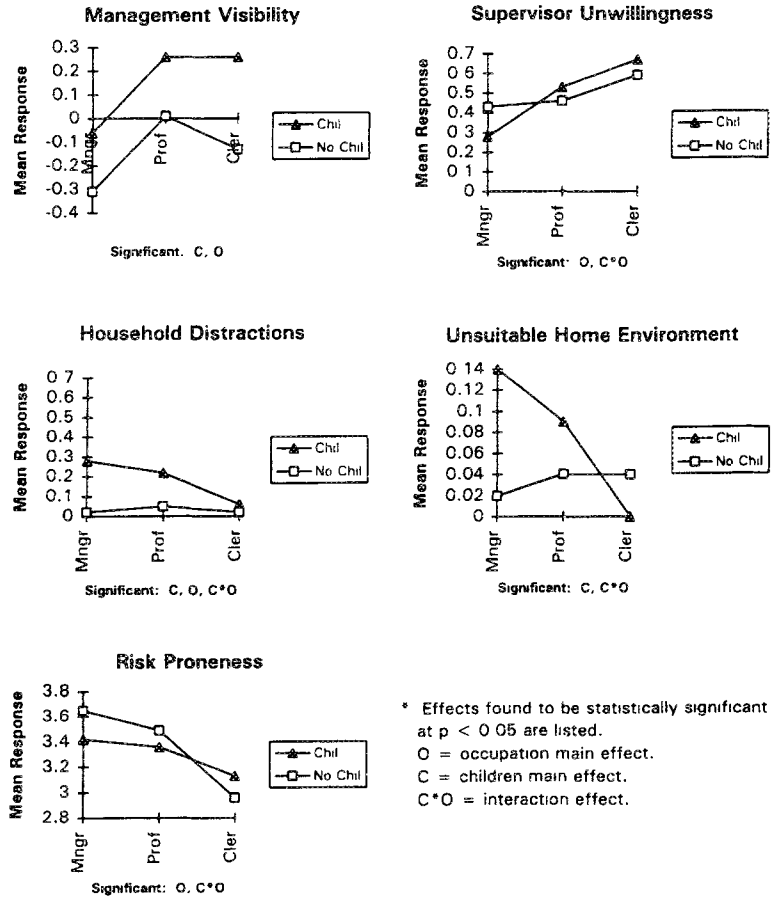
Tables 6 and 7 summarize the key findings of this study for gender and occupation, respectively. Nearly all of the specific hypotheses formulated from the literature and from judgment were corroborated to some degree by the empirical evidence. In terms of motivations:

- Women were more likely than men to cite family, personal benefits, and stress reduction as advantages of telecommuting (and this was true regardless of the presence of children);
- clerical workers were more likely than managers or professionals to see the family, personal, and office stress-reduction benefits of telecommuting as important; whereas
- managers and professionals were more likely to cite getting more work done as the most important advantage of telecommuting.

As for constraints, in the Introduction we observed that based on the differences between rates of preference and rates of choice, women appeared to be more constrained than men in their ability to telecommute, and clerical workers were more constrained than the other two occupation groups (with professional workers next-most constrained). We now better understand the specific nature of these disparities. Constraints that did *not* contribute to these disparities (i.e., that did not differ significantly by gender or occupation) included lack of awareness, cost, and lack of technology or other resources.

On the other hand, many constraints did differ significantly by gender, occupation, or both.

- In contrast to some early hopes for telecommuting (Gordon, 1976), women were more likely than men to possess the constraints of supervisor unwillingness (especially for clerical workers), risk aversion, and concern about lack of visibility to management.
- Conversely, men were more likely than women to express concerns about lack of professional interaction and about household distractions, and to view themselves as lacking discipline.



(b)

FIG. 7 (Continued)

- Constraints present more strongly for clerical workers than for other occupations included misunderstanding, supervisor unwillingness, job unsuitability, risk aversion, and (together with professional workers) perceived reduced social interaction.
- Constraints operating more strongly for professional workers included fear of household distractions, reduced social and (together with managers) professional interaction, the need for discipline, and lack of visibility to management.
- The only constraints more (or equally) strongly present for managers than for the other groups were reduced professional interaction and household distractions.

Table 8 summarizes the key findings when the effect of presence of children is examined.

- Somewhat surprisingly, those with children rated the personal benefits and relocation advantages of telecommuting no more highly than did those without children.
- However, as expected, those with children did rate the stress reduction and family benefits of telecommuting more highly than did those with no children at home.
- Strikingly, those with children were more likely than those without children to be concerned about the lack of visibility to management if they telecommuted (however, the gender and occupation effects previously noted were still significant, as well).
- And, as expected, those with children (especially managers) were more likely to cite household distractions as a constraint than those without children.

The main hypothesis not corroborated at all by the data was that women would be more likely than men to see the benefits from commuting as a disadvantage of telecommuting. However, there was a weak ($p = 0.06$) indication that those with children (male or female) were more likely than those without children to value the benefits of commuting.

Telecommuting has been labeled a "complex solution"—that is, "a single intervention which is intended to solve many problems" (Salomon, in press). In this study, we see clear evidence that telecommuting appeals to people for a variety of reasons, and further that different reasons are important to different types of people. Work is currently underway under the direction of the first author to examine motivations to telecommute in a different manner. Conceptually, the approach is to identify (using the factor scores and other measures) the extent to

TABLE 6. Summary of gender-based results.

Gender-based results	Outcome/basis*
Prior hypotheses	
G1: Women more likely to cite family reasons as advantages	Yes MI (partial), FS
G2. Women more likely to cite personal reasons as advantages	Yes: FS
G3. Women more likely to perceive stress reduction as an advantage	Yes. MI (office), FS (general)
G4: Women more likely to see lack of management visibility as a disadvantage	Yes: MI, FS
G5: Women more likely to see benefits of commuting as a disadvantage	No MI, FS
G6. Women less likely to perceive themselves as lacking discipline	Yes FS
G7: Women more likely to be risk averse	Yes: OV
G8: Women more likely to believe their supervisors are unwilling to allow them to telecommute	Yes (for clerical). OV
Other gender results	
Women more likely to see keeping same job after relocation as an advantage	Yes: FS
Men more likely to see lack of professional interaction as a disadvantage	Yes: MI
Women less likely to be concerned about household distractions	Yes. OV

* MI = most important advantage or disadvantage analysis; FS = factor score analysis; OV = analysis of other variables.

which each individual possesses each of the major hypothesized drives (work, family, leisure/independence, and travel) and then to cluster individuals on the basis of similar drive profiles. The relative sizes of each cluster will be of interest, as will be their demographic composition and the proportion of people in each cluster who desire and choose to telecommute.

We also see evidence, as Salomon (in press) suggests, that the perceived costs of (or constraints on) telecommuting are different for different people. These results can be used to inform policies (whether public or organizational) intended to support telecommuting. For example, it appears that men with children, and women in general, need reassurance that telecommuting will not necessarily jeopardize their prospects for career advancement. Concerns about loss of interaction at the workplace speak to the need for part-time telecommuting options. Job unsuitability may continue to present a barrier for clerical workers, absent technological advancements rendering their work more location-independent and/or aggressive organizational policies designed

TABLE 7. Summary of occupation-based results.

Occupation-based results	Outcome/basis*
Prior hypotheses	
O1: Managers and professionals more likely to cite work-related reasons as advantages	Yes. MI (mgrs highest, profs next)
O2: Clerical workers more likely to cite family reasons as advantages	Yes: MI, FS (weak but NS)
O3. Clerical workers more likely to cite personal reasons as advantages	Yes. FS
O4: Managers less likely to perceive reduced stress as an advantage	Somewhat FS (weak but NS support for male mgrs)
O5: Managers and professional workers more likely to see reduced professional interaction as a disadvantage	Yes: MI (mgrs), FS (both prof and soc interaction)
O6: Clerical workers more likely to see reduced social interaction as a disadvantage	Yes, with profs: MI
O7: Professionals more likely to view lack of visibility to management as a disadvantage	Yes: FS
O8: Professionals more likely to be risk averse	More than mgrs but less than clerical: OV
O9: Clerical workers most likely to believe their supervisors are unwilling to allow them to telecommute	Yes, for women (and mgrs least likely): OV
O10: Clerical workers more likely to perceive their jobs as unsuitable	Yes, for women: OV
Other occupation results	
Clerical workers more likely to see reduced office stress as an advantage	Yes: MI
Professionals more likely to see increased flexibility as most important advantage	Yes: MI
Clerical workers more likely to see keeping same job after relocation as an advantage	Yes: FS
Professionals about as likely as clerical workers to see reduced social interaction as a disadvantage	Yes. MI
Professionals more likely to see need for office discipline as a disadvantage	Yes. FS
Clerical workers had the highest level of misunderstanding; managers the lowest	Yes: FS
Clerical workers least likely to be concerned about household distractions	Yes: OV
Clerical workers least likely and professionals most likely to view selves as lacking discipline	Yes: FS

* MI = most important advantage or disadvantage analysis: FS = factor score analysis; OV = analysis of other variables; NS = not statistically significant at $p < 0.05$.

TABLE 8. Summary of presence of children-based results.

Presence of children-based results	Outcome/basis*
Motivations	
Those with children more likely to cite family reasons as advantages	Yes: FS
Of those with children, clerical workers most likely and managers least likely to cite family reasons as advantages	Yes: FS
Those with children more likely to cite personal benefits as an advantage	No (p = 0.10): FS
Those with children more likely to cite stress reduction as an advantage	Yes: FS
Those with children more likely to see keeping job after relocation as an advantage	No (p = 0.15): FS
Constraints	
Those with children more likely to cite lack of visibility to management as a disadvantage	Yes: FS
Those with children more likely to cite commuting benefits as a disadvantage	Weak but NS (p = 0.06): FS
Those with children (especially managers) more likely to cite household distractions as a constraint	Yes: OV

* FS = factor score analysis; OV = analysis of other variables; NS = not statistically significant at $p < 0.05$.

to support clerical telecommuting (e.g., partial-day telecommuting).

What this study alone cannot answer is how closely the perceived benefits and costs match the reality once telecommuting is tried. Such knowledge will be important to assess whether telecommuting lives up to its promise, and whether its costs are fair and equitably distributed. The answers to those questions, in turn, will affect forecasts of future telecommuting adoption and the development of public policy on telecommuting. Hence, the study of differences due to gender, occupation, and presence of children in a representative, multi-employer sample containing large numbers of (a) telecommuters, (b) those who want to telecommute but are not doing so, and (c) those who do not want to telecommute (including former telecommuters), would be extremely valuable.

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