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Families in a High-Tech Age

Technology Usage Patterns, Work and Family Correlates, and Gender

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This study analyzes a couple-level ($N = 581$), longitudinal data set of employees to provide evidence about technology use over time, the factors that predict use, and the potential for a spouse to influence an individual's use. Although longitudinal usage patterns suggest a trend toward adoption and use of e-mail, the Internet, cell phones, and pagers over time, this trend toward continuing use is stronger for some technologies (e-mail, the Internet) than for others (cell phones, pagers). Furthermore, correlates of use differ by gender and the type of technology used. Last, technology use tends to be an individual- rather than couple-level phenomenon, with one exception. In the case of cell phone or pager use, husbands' past use influences wives' use 2 years later.

Keywords: *couples; gender; longitudinal; technology use; work; family*

Increasingly, family scholars are interested in the implications of computer and communications technology use for family life (Chesley, 2005; Hughes & Hans, 2001; Rakow & Navarro, 1993; Watt & White, 1999). However, basic questions about use of these technologies—particularly in families—remain unanswered. For example, although several national surveys have established that computer and Internet use at home is increasing (U.S. Census Bureau, 2000), studies that focus on usage patterns over time among different household members are rare (Papadakis & Collins, 2001). At this point, it is unclear whether family members continue to use these technologies once

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they bring them into the home or whether use drops off over time. Furthermore, few studies exist that inform us about whether, or how, family members influence one another's technology use. Is adoption an individual or family phenomenon? Understanding the over time use patterns of these technologies among multiple household members is critical for determining how influential computing and communications technologies may be in family life.

In addition, the factors that influence computing and communications technology use have not been fully examined. Again, nationally representative studies of computer and Internet use have established that it is the more affluent, educated, and young, living in Asian or White households, who are more likely to own home computers or obtain Internet access (U.S. Census Bureau, 2000). Publicly available, nationally representative data on cellular phone use are more dated and suggest that the lower costs for phone purchase and monthly service are attracting users in lower income brackets (National Highway and Traffic Safety Administration, 1997). Although scholarship has reliably documented the relationships among important demographic characteristics (age, race, marital status, income, education) and computer and Internet use, research attempting to systematically link use to many of the processes expected to produce implications for family life and family relationships, such as presence and ages of children, spousal use, or home use for work purposes, is rare. Furthermore, although adoption of cellular phones continues to be as dramatic as that of computers and the Internet (Cellular Telecommunications & Internet Association, 2002; Leung & Wei, 2000), the importance of cellular phone use, along with basic information about the characteristics of users, seems to have been largely overlooked by family researchers (cf. Rakow & Navarro, 1993). Because both computing and communications technologies are implicated in the "technological revolution" (see Castells, 2000; de Sola Pool, 1990), focusing exclusively on the use of computer technology may not tell the whole technology story.

Given the increasing relevance of computing and communications technology for family research, a firm understanding of the over time use patterns observed for computing and communications technologies among multiple family members and the processes that shape use is crucial. A thorough understanding of usage patterns over time, use dynamics among family members, and use correlates for a variety of new technologies provides a basis for formulating future hypotheses about what the implications of technology use may be for individuals and their families. This article uses panel data to document the over time use patterns of computer and communications technology for a sample of dual-earner couples. I use the same data to examine the importance of work and family characteristics in shaping use of

e-mail and the Internet and cell phones or pagers to better understand the context associated with technology use. Finally, I further exploit the longitudinal nature of the data to examine whether previous technology use by a spouse influences an individual's technology use 2 years later.

Technology Usage Patterns

The specific adoption and use patterns of computers and the Internet have been thoroughly documented and reviewed elsewhere (Chesley, Moen, & Shore, 2003; Hughes & Hans, 2001). To briefly summarize, past research using cross-sectional data sources suggests that, generally speaking, greater numbers of people use computers, e-mail, the Internet, and cell phones, as the years pass. What is not well understood is whether, once adopted into the home, the same individuals continue to use these technologies or whether use drops off or shifts to other household members.

In addition, previous research has demonstrated that demographic and social-structural factors shape uneven access to and use of new technology (Papadakis & Collins, 2001). Race, ethnicity, income, and formal education have all been identified as important factors shaping use of computing technologies; we know less about the factors shaping use of communications devices. Although not always explicitly articulated in past work, interest in these socioeconomic characteristics appears linked to a prevailing theory of technology use, namely, that use is primarily a function of adequate economic and social resources. The assumption seems to be that everyone would like to use these new technologies if possible and that those with more resources are able to obtain new technology, whereas use is more difficult for those with fewer resources.

Research does underscore the importance of resources in shaping computer and Internet use. Individuals who are more affluent and educated are typically more likely to own a home computer and use the Internet (Cole et al., 2001; Haythornwaite, 2001; U.S. Census Bureau, 2000). However, income and education do not always adequately explain why particular groups of people use (or do not use) new technology. For example, a series of studies conducted by the National Telecommunications and Information Administration (NTIA) in the late 1990s found evidence that particular racial groups (Whites, Pacific Islanders) were more likely than were Blacks and Hispanics to have Internet access at home (NTIA, 1999). In a subsequent study, the NTIA examined whether income and educational disparities accounted for differential Internet access by race. They found that these disparities, although important, did not fully explain racial differences in Inter-

net use (NTIA, 2000). Furthermore, a study of dual-earner couples living in upstate New York shows that for men (but not women), as education increases, the likelihood of using a cell phone or pager is reduced, even if the effects of household income and job characteristics are controlled (Chesley et al., 2003). In other words, there is evidence that economic and social resources do not always explain why particular groups use or do not use computing or communications technology.

Gender and Technology Use

An interest in gender and technology use is usually articulated by feminist scholars who seek to demonstrate that women are less likely to use new technological tools because the value system underlying new technologies is fundamentally masculine (see review in Frissen, 1992). The general idea is that new technologies are designed by and for men in ways that discourage use by women, and scholarship in this area attempts to document the myriad processes that result in this exclusion. Empirically, gender has been identified as an important factor shaping use of computing and communications technologies, although not always in ways that are consistent with the notion of technological exclusion.

For example, an analysis of 1997 Current Population Survey (CPS) data documented a number of gender differences in computer and Internet use evident in the national population (U.S. Census Bureau, 1999). This study found large differences in the proportions of men and women who use a computer for work (56.5% of women used a computer at work compared with 44.1% of men), with more women than men using computers in every industrial sector. These sizable differences were correlated with occupation; administrative and technical jobs have higher levels of computer use, and more women are employed in these sorts of jobs. In addition, men and women were found to use computers in very different ways on the job, with more women than men using a computer for word processing or record keeping and more men than women using a computer for analysis or programming. These patterns suggest that gendered processes of occupational segregation shape access to and use of computer technology at work.

The 1997 CPS data also reveal differences by gender in home computer use, with slightly more men than women with access to a home computer actually using one. We know little about whether women and men use a home computer for similar sorts of tasks (i.e., word processing, analysis, etc.). Although more recent CPS computer and Internet data exist (U.S. Census Bureau, 2000), gender differences in computer and Internet use were not

similarly examined, so it is not clear if the differences identified in 1997 persist today.

With respect to Internet use, analyses of nationally representative samples suggest that about equal numbers of men and women are Internet users (Haythornwaite, 2001). However, some studies show that men and women use different Internet applications once online (Boneva, Kraut, & Frohlich, 2001; Cole et al., 2000; U.S. Census Bureau, 2000), whereas others do not find gender differences in types of online activities (Haythornwaite, 2001). Studies that find gender differences in the types of online activities performed by women and men report that more men use the Internet to access news or financial or hobby information (Cole et al., 2000). In addition, Boneva and colleagues (2001), using in-depth interview data collected from 41 respondents living in Pittsburgh, Pennsylvania, report a gendered pattern of e-mail use, with women spending more time using e-mail to solidify relationships with friends and family and men more likely to use e-mail for instrumental reasons, if at all.

Turning to communications technologies, past research on the telephone suggests that gender may also be a relevant factor shaping the adoption and use of cellular telephones. For example, studies of telephone use have documented that women are heavier users of residential phones than are men (Frissen, 1995). Fischer (1992, pp. 231-236) reports that numerous studies find that women talk on the phone more than men, and more detailed research concludes that a "feminine culture" surrounds telephone use (see discussion in Frissen, 1995). However, Frissen (1995) argues that men may show increasing interest in new communications technology because research documents that men use phones to access ever-increasing numbers of erotic services, such as 900 numbers, party lines, and chat lines. Yet other studies suggest that old gendered patterns may be reinforced through updated telephony. For example, female cellular phone users use their phones to aid them in managing both work and domestic responsibilities, and for this reason, women are considered an important demographic group by telephony marketers (Frissen, 1995; Rakow & Navarro, 1993). Overall, the body of past telephony research suggests that gender should continue to be investigated as a factor shaping phone use.

The Importance of Work and Family Characteristics

Empirical findings are consistent with the idea that gender differences in technology use derive, in part, from occupational differences between women and men. Because income and educational differences are also

linked to employment in the general population, it may be that employment experiences help shape technology use. For example, use of computers, cell phones, pagers, or other new devices may actually be occupation or employer driven, with the nature of the job dictating that individuals become proficient users of new technology (Burris, 1998; Hill, Miller, Weiner, & Colihan, 1998; Weil & Rosen, 1997). There is other evidence to suggest that individuals purchase and use home computers to improve performance at work or at school (Sproull, 2000). In addition, we know that access to computer technology gained through an employer is often used to facilitate personal interests (Sproull, 2000), suggesting that home use may be influenced by initial exposure through paid work.

Demographic characteristics can also be proxies for family processes. A woman's age is often highly correlated with the presence and age of children in the home, and marital status may flag a more complex family situation (i.e., a spouse, children, larger extended family). Furthermore, it is still the case that family responsibilities tend to divide along gender lines, with women generally having greater responsibility for managing home life (Risman, 1998). There is some evidence to suggest that individuals use technology to enhance family communication and better coordinate family life. For example, a small, nonrepresentative qualitative study suggests that mothers actively use cell phones to "remote-parent" children and better accomplish domestic tasks (Rakow & Navarro, 1993). Other evidence on computer and Internet use indicates that family members use computers to manage household finances and for entertainment or educational purposes (U.S. Census Bureau, 1999). Furthermore, e-mail is becoming a more common way to maintain relationships with extended family members or friends (Boneva et al., 2001).

Technology use, then, may be a function of the work and family needs of individuals. People use computing and communications technologies because they need to for work reasons or because they think these new devices will help with family needs, subject, of course, to resource constraints. Furthermore, use may not always be a personal choice because employers can require employees to use technology, even outside of the office (cf. Chesley et al., 2003; Galinsky, Kim, & Bond, 2001). Because numerous features of employment are often correlated with demographic characteristics such as education and income, the characteristics typically identified as important correlates of technology use (e.g., education, income, or gender) may actually index features of the work environment (through variables that measure employer, occupation or job, and work load) or family environment (through variables that measure presence and ages of children and a spouse or partner).

In addition, some scholars have suggested that family members can influence one another's technology use (Watt & White, 1999). For example, a family member who is not a cell phone user might come to use one to gain better access to other household members with phones. It is also possible that technology use by a family member might discourage use among others in the household if one person in the family tends to dominate the home computer. Whether or how family members influence each other's technology use is an understudied research question whose answer has implications for understanding the consequences of technology use.

Data and Method

An analysis of over time technology usage patterns by multiple household members, and the work and family correlates of this use, is possible using longitudinal data from the Cornell Couples and Careers Study (Couples Study). Telephone surveys, which took about an hour, were collected from a sample of workers employed at seven large organizations in upstate New York. Participating workers and their spouses or partners were interviewed during 1998 or 1999, with a follow-up interview in 2000 or 2001.

The seven organizations were located in three upstate New York communities and represent a range of industries (manufacturing and utility, health care, higher education) and sizes (fewer than 2,000 employees to 10,000 or more employees). In some cases, firms gave access to their entire workforce, and in other cases, only their nonhourly ("exempt") employees were included in the contact list. Based on the lists of employee contact information from each of these seven companies, a database of potential employee respondents was created by project staff members. Copies of a letter broadly describing the study aims along with response cards to be returned by employees who consented to participate were provided to each company and distributed by company staff workers. Those employees who were interested in participating and who believed they were eligible for the study returned response cards and were included in the respondent pool. It is not possible to compute a response rate for this study because the researchers have no way of determining the size of the initial group of eligible employees who received recruitment materials through their employer. Of the employees who returned a response card indicating interest in participating, 75% completed a survey (see Moen, 2003, for further information about the design and implementation of the study).

Several features of the Couples Study make it an ideal data set for examining the over time usage patterns of computing and communications technol-

ogy and the correlates of this use. First, the survey included a series of questions that asked about use of a range of technologies. Most studies to date, if they ask about technology use at all, focus on a respondent's use of one or two devices, typically computers and/or the Internet (Papadakis & Collins, 2001). Furthermore, the study was designed to examine couple-level dynamics. Because both members of a married or cohabiting couple were interviewed separately, these data are well suited to analyze technology use among two family members and gender differences in use. In addition, the Couples Study collects a broad range of information about couple members' work and home lives.

The sample was restricted to include only those men and women who were working at both periods and who are in heterosexual couples, resulting in samples of 673 women and 752 men, including a total of 581 paired couples for whom we have interviews from both partners. Restricting the sample in this way was necessary to investigate the effects of work environment on technology use and to isolate gender effects. The sample is well educated (the majority of women and men in the sample have a bachelor's degree or better) and affluent, with most working in professional or managerial occupations. Although the respondents in this study do not represent the nation of technology users as a whole, they fit the profile of people who were most likely to have access to new technology, particularly in the mid- to late 90s when the first survey was implemented. Analyses that compare the Couples Study to a similar nationally representative sample suggest that respondents in the Couples Study are slightly older, are more educated, and have higher household incomes than the national sample (see Moen, 2003, pp. 350-352).

Among those respondents who were working at Time 1, 11.3% of women and 14.5% of men did not complete a follow-up survey. Regression analyses (not shown) indicate that Time 2 participants tend to be more highly educated (those with high school diplomas, some college experience, or bachelor's degrees were compared to those with a master's degree or better). Members of couples who were cohabiting at Time 1, women with children at home, and men with children of younger ages were also less likely to participate at Time 2. Finally, men with higher job prestige scores or who reported higher workloads at Time 1 were less likely to participate at Time 2. Overall, these analyses, along with the initial focus on married and cohabiting couples with two earners, suggest that variation in family context, in particular, may be more limited than one might like.

Descriptive statistics (not shown) document other changes in the sample from Time 1 to Time 2. In all, 19% of women and 14% of men changed employers between study waves. In addition, although the distribution across organizations remained relatively stable, fewer men were employed by man-

ufacturing firms and more men were self-employed by Time 2. Although 8% of women and 10% of men reported having had a child since the last survey, the age distributions of kids in families shifted between study waves, with the age of the youngest child at home increasing from about 8 years of age at Time 1 to about 11 years of age at Time 2.

Measures

In the current study, I distinguish between two types of technology use: computer-based use (e-mail and Internet) and communications technology use (cell phones and pagers). Analyzing each type of technology separately allows the results of this study to be more easily compared to previous studies (i.e., Haythornwaite, 2001; Leung & Wei, 2000; U.S. Census Bureau, 2000). Both categories of technology were asked about in both waves of the survey, but question wording was altered slightly across waves. At Time 1, respondents were asked about "regular" use of e-mail, the Internet, and so on, so Time 1 variables are dichotomized as 0 (no regular use) and 1 (regular use). At Time 1, 75% of women and 81% of men reported regularly using either e-mail or the Internet; 52% of women and 57% of men reported regularly using cell phones or pagers at Time 1. At Time 2, respondents were asked about use on a 1 (*never use*) to 5 (*use a lot*) scale. Here, women have an average e-mail or Internet usage level of 4.32; men have an average use of 4.55. With respect to cell phone or pager use at Time 2, women have an average use of 2.93, whereas men have an average use of 3.09. In the longitudinal analyses, then, regular use versus no regular use at Time 1 is used to predict level of use at Time 2.

Examination of correlates builds on previous research (Haythornwaite, 2001; U.S. Census Bureau, 2000) by including information about a potential user's work and home life, in addition to the demographic factors (e.g., age, gender, education, income) typically examined in other studies. Binary variables (0 = no affiliation; 1 = affiliation) measure what is known about organizational context (i.e., industry and/or size of employer). Although we had fairly detailed information about the workplace of employees at each of the recruiting organizations, information about a spouse's workplace was not as comprehensive, therefore the organizational categories vary in the level of detail they capture about an employing organization. Job prestige is measured using a coding scheme described in Nakao and Treas (1994) and is used as a measure of social status. In brief, the Nakao and Treas method uses 740 occupations to assign codes that range from low scores in the 20s (i.e., hand packers and packagers = 22.05) to high scores in the 80s (physicians = 86.05). Previous work in technology studies suggests that those with higher

social status are more likely to be early adopters of new technology (Rogers, 1995, p. 269).

Other variables that capture an individual's work context include work hours ("On average, how many hours do you actually work, including any paid or unpaid hours that you put in beyond your official work week?") and three scale measures. Perceived work load measures the extent to which a person believes he or she works "fast," "hard," or "excessively" (Bond, Galinsky, & Swanberg, 1997). Perceived work performance is measured through four questions that capture the extent to which a person believes he or she performs an acceptable quantity, quality, and accuracy of work and an acceptable level of service to clients (Welbourne, Johnson, & Erez, 1998). Job scheduling flexibility measures the extent to which an employee can control the quantity, timing, and location of his or her work. This latter measure is constructed using a subset of questions from Thomas and Ganster (1995). Also included here is a variable that captures a change of employer between surveys (0 = no change; 1 = change).

Information about the age of the youngest child in the home, the total numbers of children at home, and the presence of a new child since Time 1 taps family context. The vast majority of respondents in the sample are married (> 95%), so a marital status variable is not necessary, and most respondents (95%) are White, making it difficult to account for variation in race or ethnicity. Models also include information about a person's age (measured in years), education (a categorical variable that captures high school degree, some college, bachelor's degree, or graduate degree), and the log of household income.

Results

Over Time Usage Patterns

The likelihood that an individual uses e-mail or the Internet or cell phones or pagers at Time 2, given regular use or no regular use at Time 1, is computed using ordinal logistic regression models (ologit in STATA 7.0; Statacorp, 2001). To isolate gendered patterns, models are computed separately for men and women. These models include information about age, education, household income (logged), employer, work hours, job prestige, job characteristics (role performance, perceived work load, job scheduling flexibility), change of employers between surveys, presence and age of kids in the home, and new child since Time 1 to better isolate the work and family factors associated with use of particular types of technology. The predicted likelihood of use estimated through these models is presented in Table 1.

Table 1
Predicted Probability of Level of Technology Use at Time 2 Given Time 1 Use, by Gender

Time 1 Use or No Use[a]	Probability of Time 2 Use (%)					Cumulative Probabilities (%)	
	1 (*Never*)	2	3	4	5 (*A lot*)	Any Use (2-5)	High Use (4-5)
E-mail or Internet							
Women[b]							
T_1 regular use	2.0	2.5	5.4	13.3	76.8	98.0	90.1
T_1 no regular use	6.4	7.1	13.1	23.4	50.0	93.6	73.4
Men[c]							
T_1 regular use	0.9	1.7	2.2	10.2	85.1	99.1	95.3
T_1 no regular use	5.6	9.6	10.4	29.0	45.4	94.4	74.4
Cell phone or pager							
Women[b]							
T_1 regular use	9.9	9.6	23.1	18.0	39.3	90.1	57.3
T_1 no regular use	47.2	19.2	19.4	6.8	7.4	52.8	14.2
Men[c]							
T_1 regular use	9.9	12.6	17.0	19.4	41.3	90.1	60.7
T_1 no regular use	42.5	23.7	15.3	9.1	9.3	57.5	18.4

a. Time 1 e-mail or Internet use, or cell phone or pager use is a binary variable where regular use = 1 and is significant at the $p < .01$ level for both women and men (see Table 2).
b. $n = 673$.
c. $n = 752$.

The results on e-mail or Internet use and cell phone or pager use during the 2-year period confirm that regular technology use at Time 1 predicts use at Time 2. For example, both women and men who reported being regular e-mail or Internet users in 1998 and 1999 have a very high likelihood (98% and 99%, respectively) of using these technologies in 2000 and 2001. In fact, the vast majority of women and men who reported regular Time 1 e-mail or Internet use are quite likely to report frequent use at Time 2 (90% and 95%, respectively). Among those respondents who reported no regular use at Time 1, most are likely to use these technologies at Time 2 (likelihoods of about 94% for both), with a quite high probability (about 74% for both) of more frequent e-mail or Internet use (a 4 or 5) at Time 2. In addition, the pattern of probabilities at each level of use appears similar for both men and women.

The probability of cell phone or pager use at Time 2 given use at Time 1 differs a bit from the patterns observed for e-mail or Internet use. Although the same general pattern holds, with regular users at Time 1 likely to continue use 2 years later, the patterns of probabilities for those who did not report regular use at Time 1 suggest that adoption and use of cell phones or pagers lags behind that of e-mail or Internet applications. Users who reported no regular use of cell phones or pagers at Time 1 are fairly likely to report never using these devices at Time 2 (47% for women; 43% for men). This finding is in contrast to the results for e-mail or Internet use, where very few Time 1 users reported nonuse at Time 2. Furthermore, both men and women in this category have a relatively small chance (14% for women, 19% for men) of using these devices frequently at Time 2 (i.e., at a 4 or 5 level) if they do not have a history of regular cell phone or pager use. A notable 10% of Time 1 regular users reported no Time 2 use. As with e-mail or Internet use, the patterns of cell phone or pager use likelihoods appear similar for both men and women.

Correlates of Technology Use

The correlates of e-mail or Internet and cell phone or pager use are presented separately for women and men in Table 2. In general, the models reveal two broad patterns. First, accounting for the work and family context of these respondents provides some clues about why they might use these technologies in their daily lives. Second, characteristics that are associated with technology use can differ across genders and for computing versus communications technologies.

E-mail or Internet use. With respect to e-mail or Internet use, the demographic relationships are what we would expect given trends already established in nationally representative data sets (Haythornwaite, 2001; U.S. Census Bureau, 2000). Older individuals tend to be less likely to use e-mail or the

Table 2
The Influence of Time 1 Technology Use on Time 2 Use, by Gender

	E-mail or Internet				Cell phone or pager			
	Women[a]		Men[b]		Women[c]		Men[d]	
Characteristic	Odds	*SE*	Odds	*SE*	Odds	*SE*	Odds	*SE*
Individual (T_2)								
Age	0.97	0.02	0.95**	0.02	0.96**	0.01	0.95**	0.01
High school or less[e]	0.68	0.23	0.56	0.21	2.01*	0.57	1.20	0.35
Some college only[e]	0.80	0.24	0.80	0.27	1.59†	0.41	2.10**	0.52
Bachelor's degree[e]	1.36	0.34	0.67	0.17	1.82**	0.36	1.31	0.24
Workplace (T_2)								
Utility[f]	0.87	0.51	0.74	0.28	1.36	0.56	2.08*	0.62
Health care[f]	0.32**	0.12	0.53	0.23	1.41	0.43	0.93	0.31
Higher education[f]	0.79	0.28	1.10	0.37	1.22	0.29	0.78	0.17
Government or nonprofit[f]	0.15**	0.07	1.30	0.64	0.85	0.32	0.75	0.29
Education (K-12)[f]	0.56	0.22	0.11**	0.07	0.94	0.29	1.20	0.82
Other large (> 50)[f]	0.45†	0.21	0.70	0.24	1.0	0.33	1.22	0.30
Other small (< 50)[f]	0.12**	0.05	0.60	0.24	0.83	0.34	1.33	0.43
Organization not known[f]	0.20**	0.10	0.32*	0.17	1.72	0.74	2.17†	0.95
Self-employed[f]	0.30	0.22	0.35*	0.16	1.31	0.79	3.43**	1.46
Job context (T_2)								
Work hours	0.10	0.01	1.01	0.01	1.02*	0.01	1.02†	0.01
Job prestige	0.99	0.01	1.02*	0.01	1.00	0.01	0.98**	0.01
Role performance	1.19	0.22	1.76**	0.35	1.35†	0.21	0.92	0.14
Work load	1.09	0.20	0.84	0.17	1.03	0.16	1.46*	0.23
Job scheduling flexibility	1.76**	0.22	1.73**	0.24	0.98	0.10	1.60**	0.18
New employer since T_1	1.75*	0.44	1.88†	0.62	0.91	0.19	1.83**	0.42
Salary	—	—	1.00	0.00	—	—	—	—
Family context (T_2)								
Household income (logged)	1.39	0.40	—	—	3.56**	0.88	2.42**	0.57
Age of youngest child	0.99	0.02	0.99	0.02	1.00	0.02	1.00	0.02
No. of kids in home	0.94	0.09	0.93	0.08	1.02	0.08	0.97	0.06
New child since T_1	0.28**	0.10	0.74	0.28	1.24	0.40	0.72	0.21
Technology use (T_1)								
E-mail or Internet	3.32**	0.70	6.86**	1.51	—	—	—	—
Cell phone or pager	—	—	—	—	8.12**	1.36	6.83**	1.10
McKelvey and Zavoina's R^2		.35		.33		.35		.41

a. $n = 651$.
b. $n = 734$.
c. $n = 652$.
d. $n = 735$.
e. Comparison group is respondents with a graduate degree.
f. Comparison group is respondents working at large manufacturing firms.
†$p < .10$. *$p < .05$. **$p < .01$.

Internet, although the coefficient is statistically significant for men only ($p <$ .01). The patterns in the education coefficients tend to match what is already established in other studies in that the more educated are also more likely to use e-mail or the Internet. Again, the education coefficients are not significant for either men or women, but that is probably because of the high level of educational attainment in this sample.

E-mail or Internet use and workplace or job context. One of the most striking things about the e-mail or Internet models for men and women is that organization and job context variables are often significant predictors of e-mail and Internet use, whereas family variables are typically not playing a role in explaining the variance in Time 2 use. In the case of women, relative to women working at large manufacturing firms, women in other work environments are less likely to use e-mail or the Internet. This is not a function of women's job prestige because we have controlled for that possible effect, but it is probably because of occupational differences or organizational culture and work practices that are not specifically accounted for here. For men, the organizational variables are not as important, although it is clear than men in K-12 educational settings and the self-employed use e-mail and the Internet less than do men in manufacturing settings. Unlike the women, men's job prestige is an important positive predictor of their e-mail or Internet use ($p <$ .05).

It is interesting that women's perceptions of their job performance and work load, and their reported work hours, do not influence their propensity to use e-mail or the Internet because scholars often speculate that technology use is linked, either negatively or positively, to workload and performance (Sproull, 2000; Weil & Rosen, 1997). This is in contrast to what is observed for men in this sample. Men who provide higher role performance ratings are more likely to use e-mail and the Internet than are other men ($p < .01$). Furthermore, women and men who reported greater control over the timing and scheduling of their work are also more likely to be e-mail and Internet users ($p < .01$). Of course the direction of these relationships is unclear in the current analysis. Are men's perceptions of their performance shaped by how adept they are with new technology? Do people with more job flexibility also have greater access to technology, or does the technology create the flexibility? Determining the causal direction of these particular relationships, however, is beyond the scope of this article. Finally, women and men who changed employers between surveys are more likely to use e-mail and the Internet, although the coefficient for men is significant only at the $p < .10$ level.

The family variables included in the models are relatively unimportant in predicting who will be an e-mail or Internet user. Although the household

income coefficient suggests that women in households with higher incomes are more likely to use these technologies (in keeping with the results of other studies), this coefficient is not statistically significant. Note that family income was included in the women's model and salary was included in the men's model because preliminary analyses suggested that salary, rather than household income, was positively related to men's e-mail or Internet use. The only family variable that appears to influence e-mail or Internet use is the presence of a new child since the last survey. Women, but not men, who have a new child at home are significantly less likely to use e-mail or the Internet than are other women ($p < .01$). Finally, as has already been discussed, regular e-mail or Internet use at Time 1 significantly increases the likelihood that both women and men will use these technologies at Time 2 ($p < .01$).

Cell phone or pager use. The direction of demographic relationships observed for cell phone or pager users provides some unexpected findings. With respect to age, older individuals are less likely to use cell phones or pagers than are younger users, which is what one might expect if the factors driving use of computer-based technologies are similar to the factors that underlie use of newer communications technologies. However, the relationship between educational attainment and cell phone or pager use is the reverse of what is typically observed for computer or Internet users. Women and men with lower educational attainment are more likely to use cell phones or pagers than are those with graduate-level educations. Men who reported having completed some college and women who reported completing high school or college are about twice as likely to use these communications technologies as are respondents with graduate degrees.

Organization and job context appears relatively unimportant in determining women's use of communications technology and only slightly more important in determining men's use. For women, where one works does not appear to play a role in influencing cell phone or pager use, whereas one's work hours and, perhaps, one's perceptions about job performance ($p < .10$) positively influence use. For men, two organizational contexts are clearly important determinants of use: employment with utilities and self-employment. Relative to men who work at large manufacturing firms, men employed with utilities or who employ themselves are more likely to use a cell phone or pager. This suggests that particular occupations or job settings play a role in shaping cell phone or pager use.

Characteristics of men's jobs also appear to influence their cell phone or pager use. Although only marginally significant ($p < .10$), as we saw with women, men who reported greater Time 2 work hours are also more likely to be cell phone or pager users at Time 2. Furthermore, men who perceived that

they were working fast, hard, and excessively were more likely to use communications technology ($p < .05$). Men in lower prestige jobs are more likely to use these devices ($p < .01$) as are men who reported higher perceived workload ($p < .05$) and more control over the timing and scheduling of their work ($p < .01$). Finally, men who changed employers between survey waves are almost twice as likely to use cell phones or pagers as are men who stayed with their same employer ($p < .01$).

As we saw with e-mail or Internet use, family factors are relatively unimportant in predicting who uses cell phones or pagers. Here, family income is the only significant factor shaping use. Not surprisingly, for both men and women, as family income increases, so does the likelihood of being a cell phone or pager user. Finally, use of cell phones or pagers at Time 1 greatly increases the likelihood of using these devices at Time 2.

Couple-Level Use Dynamics

Another missing link in the technology story concerns the question of household use dynamics. Do household members influence one another's technology use? The longitudinal couples data can be used to examine whether or not a spouse's use of a particular technology increases the likelihood that an individual will use computer or communications technologies in the future.

To test this proposition, spouse's Time 1 use and an interaction term (Wife's Time 1 Use × Husband's Time 1 Use) were added to the models documented in Table 2. The coefficients of interest are reported in Table 3. Note that the sample is now limited to the 581 cases with information on wives and husbands at both periods.

In the case of e-mail or Internet use, a spouse's Time 1 e-mail or Internet use does not appear to influence an individual's Time 2 use. For example, in the case of wives, adding information about husbands' e-mail or Internet use at Time 1, and accounting for a possible interaction in e-mail or Internet use, adds no explanatory value to the model. The same is true when we add information about wives' Time 1 use and the interaction term to the husbands' model.

However, in the case of cell phones and pagers, the data suggest that husbands' Time 1 cell or pager use can influence whether their wives adopt and use these technologies 2 years later. When we add information about husbands' Time 1 cell phone or pager use and an interaction term to the model predicting wives' Time 2 cell pager use, the coefficients for both wives' and husbands' Time 1 use are significant ($p < .05$), and the interaction term is marginally significant ($p = .06$). To better understand the effect of husbands' prior cell phone or pager behavior on wives' future use, the predicted proba-

Table 3
Assessing the Influence of Spouse Technology Use on Individual Use

	Regression Coefficient	
Predicting Time 2	Wives	Husbands
E-mail or Internet use		
Wives' T_1 e-mail or Internet use	1.05**	0.02
Husbands' T_1 e-mail or Internet use	–0.06	1.51**
Wives' T_1 E-mail or Internet Use × Husbands' T_1 E-Mail or Internet Use	0.36	0.57
McKelvey and Zavoina's R^2	.36	.39
n	561	560
Cell phone or pager use		
Wives' T_1 cell phone or pager use	2.49**	0.27
Husbands' T_1 cell phone or pager use	0.55*	1.85**
Wives' T_1 Cell Phone or Pager Use × Husbands' T_1 Cell Phone or Pager Use	–0.69†	–0.13
McKelvey and Zavoina's R^2	.37	.41
n	563	562

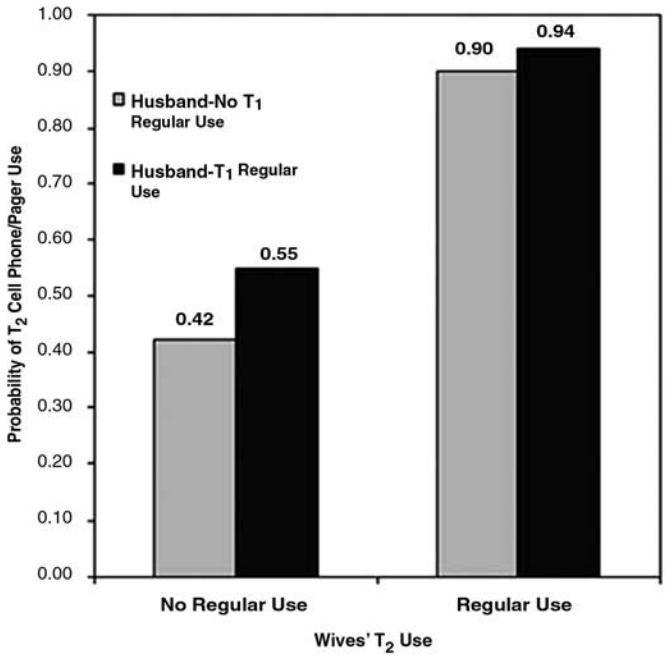
Note: These models add spouse use and a husband or wife interaction term to the models reported in Table 2 but utilize the sample of 581 couples.
†$p < .10$. *$p < .05$. **$p < .01$.

bilities for wives are graphed (see Figure 1). The probabilities in the graph are the cumulative likelihood that wives use cell phones or pagers at levels 2 through 5 (recall that a 1 on this scale tracks no use). In the case of wives who reported no regular cell phone or pager use at Time 1, their probability of use at a 2 through 5 level at Time 2 is 0.42 if their husband also did not regularly use these devices at Time 1, but 0.55 if he did, a 13-point difference. Not surprisingly, the effect of husbands' prior behavior is not so striking in cases where wives were already regular cell phone or pager users (a four percentage point difference). Although husbands' prior behavior with cell phones or pagers appears to influence the likelihood that their wives will use these devices by Time 2, the reverse is not true. Wives' prior cell phone or pager use does not appear to influence their husbands' use at follow-up.

Conclusion

A greater understanding of over time usage patterns associated with computer and communications technology use, the context that underlies use, and the potential for family members to influence use patterns of others in the household is necessary if family researchers are to pinpoint the implications

Figure 1
The Influence of Husbands' T1 Cell Phone/Pager Use on Wives' T2 Cell Phone/Pager Use



of technology use for family life. This article broadens the approach to studying technology use in families through an analysis of longitudinal data that measures use of both computer-based technology (e-mail and the Internet) and communications technology (cell phones and pagers). Furthermore, linking the use of multiple household members (husbands and wives) allows us to investigate the potential for interplay among the use patterns of family members and investigate differences in use between men and women.

Although cross-sectional data sources suggest that increasing numbers of Americans are using computers, the Internet, and cell phones, what is not clear is whether initial adoption of these technologies results in steady use by the same individuals over time. These data suggest that members of dual-earner households tend to continue to use both computing and communications technology in the future if they have used it regularly in the past. Furthermore, even nonusers or occasional users are likely to use or increase their use of these technologies as computers and cell phones become more entrenched in everyday life.

Although gender differences in over time usage patterns are not apparent, there are differences across types of technology. Although most of the individuals in the sample were likely to be e-mail or Internet users by 2000 or 2001, there is a fairly high probability that women and men (42% and 47%, respectively) were not using cell phones or pagers at Time 2. E-mail and Internet technology, then, appears to be more firmly entrenched than is cell phone or pager use, at least among the men and women in this sample.

What accounts for this resistance or lag in cell phone or pager use relative to e-mail or Internet use? It may be that land line phones are a close enough substitute for cell phones or pagers so that family consumers more easily resist the extra expense of cellular technology. It is harder to imagine good substitutes for a home computer with Internet access, particularly in the late 90s. It is also possible that the geographic nature of the sample can explain this finding. Perhaps there is something about the wireless market in central New York (e.g., not enough providers, poor service, etc.) that is linked to the resistance of cellular technology relative to computer technology.

When investigating the correlates of technology use, the findings suggest that different work and family characteristics matter in shaping the technology use of men and women. Information about the workplace and the job does provide clues about why people use computer and communications technology, even if that use happens outside of work. A number of other scholars have described the ways in which work-related technology use can influence home life (Haddon & Silverstone, 2000; Lewis & Cooper, 1999; Sproull, 2000); these results are consistent with the argument that work context matters in shaping more general technology use.

Interestingly, family context variables, such as the presence and ages of children, appear relatively unimportant in determining technology use for these men and women, in spite of other research (e.g., Frissen, 1995; Rakow & Navarro, 1993) that suggests that these variables might be important factors, particularly for cell phone or pager use. However, the missing link between family context and technology use may be an idiosyncrasy of the Couples Study sample. Recall that the initial sample focused on dual-earner married or cohabiting couples and that attrition analyses showed that men and women with young children at home were more likely to drop out of the study by Time 2. It may be that limited variation in family context in the Couples Study sample or the limited number of family measures included in the analysis precludes me from documenting a link between the family variables measured and technology use. Perhaps cell phones for remote parenting, to use one example, are more important to parents with young children at home, the very parents who are less likely to be in the sample by Time 2.

In addition, the results indicate that technology use tends to be an individual-level, rather than a couple- or household-level, phenomenon, with one exception. In the case of communications technology, husbands with exposure to cell phones and pagers may convince their wives to also adopt and use these technologies. It is telling, however, that this influence only flows in one direction (i.e., from husbands to wives) and may also be evidence of men's role as the household "technology expert" (cf. Watt & White, 1999).

Findings from this project suggest there is much to be gained by broadening the investigation of technology use to include use of new communications technology and computer-based applications. Furthermore, expanding the investigation of determinants to include information about work and family life provides a deeper understanding of the everyday context that shapes technology use, at least for working couples such as these. Linking the use of household members, in this case husbands and wives, to analyze the extent to which family members influence one another's technology use was also an important contribution of this study. Future research should try to examine the role of organizational policies and settings and other family characteristics in shaping access to and use of new technology. It would also be interesting to examine use by other family members, especially children. Last, replicating these findings in nationally representative data should be a goal for future research.

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