

## **E-Mail Use Patterns in the United States**

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*ABSTRACT: This study analyzes data to determine who uses e-mail more in the United States through bivariate correlation and multiple linear regression. The results show that demographic variables such as age and region, socio-economic status variables such as education and household income, and the variable of having enough time to get the job done, play significant roles in predicting the patterns of e-mail use. Those with higher levels of education, or household income, or with enough time to get the job done, or who live in the South, are more likely to use e-mail for more hours each week. The older the respondents are, the less likely they are to use e-mail. Gender, race, and marital status make no difference. Few studies have explored the patterns of e-mail in terms of specific hours of e-mail use. These findings will help librarians and e-mail providers to offer better tools and services.*

### **I. Introduction**

In the information age, the rapid development of information technologies, the Internet, and telecommunications have brought great changes to people's daily lives, learning, and work. With computerization, more and more people make use of electronic e-mail tools to communicate and perform routine business tasks. In *E-mail on the Move*, Kevin Fitchard (2003) stated that "The Yankee Group estimates that corporate subscribers e-mailing wirelessly broke the 1 million mark in 2002 and will reach 9.4 million by 2007, when wireless e-mail is set to become a \$3.5 billion industry."

Sending and answering e-mails has become one of people's daily activities. An online survey with 4000 participants from more than 18 cities in the United States was conducted by American Online, and the results indicated that "users rely on e-mail as much as the phone for communication, and spend about an hour a day on e-mail" (*Is E-Mail Taking Over?* 2005). The above findings imply that some e-mail users do not spend an hour a day on e-mail; whereas others use e-mail for over an hour per day. The patterns of e-mail use vary among individuals.

How many hours per week do people spend sending and answering e-mail? Who is more or less likely to use e-mail? What patterns in e-mail use are shown? What factors determine e-mail use in the United States? These are the foci of this study. These questions are answered by using the 2000-2004 General Social Survey data and analysis of bivariate correlation and multiple linear regression. The current study on e-mail use involves many areas such as library and information studies, information technology studies, and human-computer interaction. The findings in this study will help librarians and e-mail providers to offer better e-mail tools and services.

## **II. Literature Review**

Electronic mail (also called e-mail or email) does not have a long history. The literature on e-mail has seen growth in recent years with the rapid development of other information technologies and a rapidly increased number of users. A review of the literature reveals that the coverage of such studies is over many aspects of e-mail, such as its technological developments, computer-based external email systems, and email applications.

Some literature conveys opinions on what e-mail is, use of e-mail, how e-mail works, and the offering of library and information services through email (Dewey, 1989; Naqvi, 2001). There is no agreement on what e-mail is. It is defined as a method, a system, or a form of messaging. The e-mail services of organizations involve internal and external systems. E-mail can also be defined as a communication tool for the transmission of information over internal and external networks.

This review focuses on empirical studies of e-mail use. Many empirical studies of the use of e-mail are cross-sectional. Data are collected at only one point in time (Bridges & Clement, 1997; Dabbish, et al., 2005; Duran, Kelly, & Keaten, 2005; Gefen & Straub, 1997; Haworth, 1999; Kelly, Duran & Zolten, 2001; Kiel, 2005; Krishnamurthi, 1998; Levy & Foster, 1998; Minkel, 2002; Sheffer, 2003; Stevens & McElhill, 2000). A survey is most frequently used in such studies. Fewer researchers use interview or triangulation methods. Those studies make suggestions on viewing e-mail from a corporate perspective through the triangulation of research methods: interviewing and surveying (Stevens & McElhill, 2000); examining people's actions in e-mail messages and ratings of the importance of e-mail messages (Dabbish, et al., 2005); identifying an e-mail use gap among the elderly (Kiel, 2005); analyzing the determinants of student e-mail use (Haworth, 1999); determining the patterns of faculty-initiated e-mail use with students (Duran, Kelly, & Keaten, 2005); patterns of e-mail use for Humanities faculty (Bridges & Clement, 1997); "gender differences in the perception and use of e-mail"(Gefen & Straub, 1997); "e-mail use patterns and attitudes toward e-mail among students" (Krishnamurthi, 1998); "attitudes and perceptions of state legislators toward e-mail on the basis of age and gender" (Sheffer, 2003); the effect of reticence on college students using e-mail (Kelly, Duran, & Zolten, 2001); and e-mail use in academic libraries through a mixture of research

methods: survey and interview (Levy & Foster, 1998). Levy and Foster's (1998) study focuses on "the intra-organizational use of e-mail."

A few empirical studies of the use of e-mail are longitudinal. Data are collected at two or more points in time (Lantz, 2003; Rice, 1994; Mitra, et al., 1999; Van der Meij & Boersma, 2002). Those studies focus on patterns and content of e-mail use in elementary school (Van der Meij & Boersma, 2002), the amount and pattern of e-mail use (Rice, 1994), e-mail use for faculty (Mitra, et al., 1999), and the change of e-mail use over time (Lantz, 2003). The main research methods employed in those longitudinal studies are surveys and interviews.

The empirical literature on e-mail use has produced some results through the analysis of how different groups of the population use e-mail. Some studies focus on students with communication problems, and how faculty and students use e-mail. Kelly et al. (2001) examined reticent and nonreticent students' use of e-mail to communicate with faculty, and found no difference in the frequency of e-mail use among nonreticent students in communicating with their professors and reticent students' preference for e-mail use over face-to-face communication with faculty. Dabbish et al. (2005) found that professors or scientists read more e-mail messages than students or staff every day on the basis of job role.

Haworth (1999) examined the factors that affected students e-mail use, and found that course-dedicated web sites and previous Internet experience affected students e-mail use. He also found that "the connection between GPA and e-mail use is weak at best." As for the question of how students view e-mail, infrequent e-mail users viewed it as a complement to existing methods of contacting their professors. Frequent e-mail users, however, viewed it as a substitute for existing methods. Krishnamurthi (1998) found four positively correlated factors with college students' use of e-mail in a university school of business and economics: ". . . using e-mail to overcome the constraints of time," "wanting to use e-mail to overcome the inhibitions in face to face communication," "students perception of their keyboard skill," and "the relationship between computer anxiety and e-mail use, and system user-friendliness and e-mail use." That study was conducted in classroom settings, and the sample size was very small. The interpretations of the results of that study are limited because the subjects in the sample had a "the high level of computer literacy." As Krishnamurthi (1998) stated, "a completely different set of predictors can emerge when Liberal Arts Majors are surveyed."

What Duran, Kelly, and Keaten (2005) argued centered on faculty-student communication, faculty use of e-mail, and out-of-class communication. The faculty was found to receive more e-mail messages than those they initiated. In addition, there were gender differences in receiving student e-mail (Duran, Kelly, & Keaten, 2005). Duran, Kelly and Keaten (2005) explicated their arguments through quantitative and qualitative data analysis. Most of the arguments are valid. Bridges and Clement (1997) found the differences in Humanities faculty patterns of e-mail use

in terms of institution, gender, and age. "The location of e-mail use" was found to be a significant factor affecting the amount of time spent using e-mail. Most of the Humanities faculty had taught themselves how to use email, used e-mail more in their offices, and "seldom use[d] e-mail to contact campus librarians for research assistance and information about collections and services." Sheffer (2003) found there existed significant differences in state legislators' attitudes and perceptions of e-mail use on the basis of age and gender."

Lantz's (2003) longitudinal study has examined a variety of patterns in e-mail use. Participants during the 5-year study period were librarians, constructors, and managers. Lantz found that "The flow of messages was stable," and that "Time to handle mail was stable over the 5 years." Time was found to be an important factor in dealing with e-mail traffic. Work tasks have an effect on whether or not the employee had the time to cope with e-mail.

Some studies have focused on teen use of e-mail. Minkel (2002) did not conduct the interview and survey. He primarily discussed the results of American Online "interviews with 6700 teens age 12 and up" and the e-mail use "study by the Pew Internet and American Life Project, "Teenage Life Online"" in combination with exploring the issue of whether e-mailing at school is permissible. The results of interviews show that "81 percent of teens between 12 and 17 use the Internet to e-mail friends or relatives, and 70 percent use it for instant messaging."

Van der Meij and Boersma (2002) demonstrated e-mail usage in elementary school by analyzing the exchange patterns and contents of a total of 87 recorded email groups. They found that stacking and compounding are features of exchange patterns in e-mail.

The variables such as age, gender, race, education level of the teen's parents, and household income were used to examine teens' patterns of e-mail use (Lenhart, Madden, & Hitlin, 2005). Lenhart et al. (2005) determined that teens who are 14 and older, or who go online more frequently are more likely to use e-mail; girls are more likely to use e-mail than boys; and white teens are more likely to use email than African-American teens. Teens whose parents had higher levels of education were more likely to use email (Lenhart, Madden, & Hitlin 2005). A family's household income did not make a difference in predicting teen e-mail use (Lenhart, Madden, & Hitlin 2005).

The length of use has been used as a factor in examining patterns of e-mail use. The results of the surveyed Humanities faculty displayed gender and age differences in the minutes of e-mail use per week (Bridges & Clement, 1997). Kiel (2005) examined the patterns of e-mail use per week in terms of the specific hours that the elderly spend using e-mail. According to Kiel (2005, p. 22), "As for e-mail, 75% (42) had used it for two years or less, and two-thirds spent 1-2 h per week using it," and "Of this sample,

e-mail use was low." This suggests that the elderly are more likely not to spend many hours per week using e-mail.

Few empirical studies have explored the patterns of e-mail in terms of specific hours of e-mail use. This study could be useful in providing more significant patterns of e-mail use.

### **III. Hypotheses**

Patterns of e-mail use depend on many factors. In this study, based on the available 2000-2004 GSS data, three types of variables are used: demographic, socio-economic, and employment.

#### *1. Demographic variables*

Age and gender are very important factors in predicting patterns of e-mail use. Other variables may include race, marital status, and region. Kiel's (2005) study suggests that the elderly are less likely to spend many hours per week using e-mail. It is hypothesized that the younger the respondents are, the more likely they are to spend many hours per week using e-mail. Bridges and Clement's (1997) survey of 496 tenured and tenure-track Humanities faculty at Brigham Young University and the University of Tennessee, Knoxville, shows that there is a gender difference in e-mail use as female Humanities faculty spent more time using e-mail than did their male counterparts. In this study, it is hypothesized that males are less likely to use e-mail more hours per week compared with females.

#### *2. Socio-economic status variables*

Socio-economic status variables are used in the analysis of e-mail use. A web-based survey conducted by Dabbish et al. (2005) demonstrates that professors or scientists read more e-mail messages than students or staff every day on the basis of job role. Most of professors hold doctorate degrees, which suggest taking more roles and responsibilities of teaching, research, and service, and therefore might use e-mail more. Lenhart et al. (2005) found that teens whose parents had higher levels of education were more likely to use email, which implies that education level is an important variable to affect people's e-mail use. It is expected that the more educated the respondents are, the more likely they are to spend more time using e-mail.

#### *3. Employment variables*

According to Dabbish et al. (2005), "work demands and relationships" may result in differences in the usage of e-mail. Therefore, the employment variables are utilized in this study. Compared with government employees, private employees are more likely to use e-mail for more hours because their working environments are more dynamic and flexible, and they need to establish proactive and strong relationships with

customers. The fact that a person has enough time to get the job done shows that he or she need not work overtime, may have more time to go online, and is more likely to use e-mail for more hours to communicate with his or her family and friends.

#### **IV. Data and Analytic Techniques**

The 2000-2004 GSS data are utilized in this study. The 2000-2004 GSS is a nationally representative sample of the US adult population. In the survey, the respondents were asked about how many hours per week they spend sending and answering e-mail (Davis, Smith, & Marsden, 2005). From the collected data, it is possible to determine who is more likely to spend hours sending and answering e-mail every week. The largest valid sample size for analyzing the patterns of e-mail use in the United States is 1872. The sample sizes for multiple linear regression models vary because there are missing values for some independent variables.

The dependent variable is e-mail hour per week, an interval-ratio variable. The independent variables are age (ratio and continuous variable), gender (nominal and discrete variable), race, region, marital status, education, income, occupation, government or private employee, labor force status, work arrangement at main job, and having enough time to get the job done.

The techniques used to analyze the data are bivariate correlation and multiple linear regression, which "looks at relationship between one 'effect' variable, called the dependent or outcome variable, and one or more predictors, also called independent variables" (Muijs, 2004, p. 160), and with which "we can determine the effects of the different independent variables on the dependent variable" (Punch, 2005, p. 79). As far as a dependent variable is concerned, the fundamental model is first examined, including the demographic variables such as age, gender, race, region, and marital status. Secondly, such socio-economic status variables as education, income, and occupation are added. The employment variables are finally included and tested.

#### **V. Findings**

Table 1 (see [Appendix 1](#)) shows the means, medians, standard deviations, and ranges of the variables. As shown in Table 1, the mean for e-mail hours per week is 4.1 and its standard deviation is 7.2. The average age of respondents is 46.3 years with a range from 18 to 89. Males make up 54.2% of the sample. Whites are 78.7% of the sample, African-Americans 14.5%, and other races 6.7%. The never-married account for 25.6%. The average year of schooling is 13.4 years. The mean for household income is 15.9, which indicates that the average household income of the respondents is between \$30,000 and \$34,999.

Table 2 (see [Appendix 2](#)) reports multiple regression estimates predicting e-mail hours per week by the independent variables. The effects of seven main independent predictors are estimated relative to the reference categories. Model 1 shows the

baseline differences in scores for demographic variables relative to e-mail hours per week. Age and region make a difference. The effect of age on e-mail hours per week is -0.036, indicating that increase in age is very significantly associated with lower levels of e-mail use. Model 2 includes critical predictor variables and tests whether the effects of demographic variables persist. The results from Model 1 remain, regardless of the significant effect of other race, years of schooling, and household income. It is surprising that, given previous suggested research result on patterns of e-mail use, gender is not an important predictor of hours of e-mail use each week. Model 3 adds four employment variables. Two variables (private employee and having enough time to get one's job done), although significant, do not change the results from Models 1 and 2. Specifically, after controlling for key employment variables, the results show that age, region, schooling, household income, and occupational prestige are significantly associated with the hours of e-mail use every week. The elderly are less likely to use e-mail for many hours every week. Those who live either in the South or in the West, or who have more education are more likely to spend more hours sending and answering e-mail each week, as are those who have a higher household income, or enough time to get their jobs done, or are private employees.

In Table 3 (see [Appendix 3](#)), bivariate correlations show that there are many significant relationships between the variables and the hours of e-mail use per week. The variables of living in the Midwest, and a private employee (but not a permanent employee) are negatively correlated with the hours of e-mail use. The other variables of household income, occupational prestige, and having enough time to get the job done are positively correlated with the hours of e-mail use. The results of the correlation matrix indicates that schooling has the strongest correlation with e-mail hours per week ( $r = 0.158$ ) and confirms that those with higher education levels are more likely to spend more hours using e-mails per week.

## **VI. Discussion**

These analyses explore the differences in using e-mails in terms of hours per week across different demographics. The strength of this study is that the analyses update some of the related studies in patterns of e-mail use in the United States among individuals by using a nationally representative data set.

The proposed hypotheses are supported by the data. Table 2 displays that the two variables, age and living in the South, have a consistent effect on dependent variable in three models. The three variables, living in the West, schooling, and household income, have a consistent effect on dependent variables in two models. As Lenhart, Madden, and Hitlin (2005, p. 15) stated in the study of patterns of e-mail use of youth ages 12-17, "age alone is also a factor in email use." The age of respondents in this study ranged from 18 to 89. Age has a significantly negative effect on the dependent variable as shown in Table 2. This result meets the expectation based on Kiel's (2005) study. The older the respondents are, the less likely they are to use e-mail often each

week. For each additional year increase in age, the hours of e-mail use will decrease by .041 hour.

Currently, many young people pursue their degrees through the rapidly increased distance education programs at colleges and universities. They take online classes at work, over the weekend, or at night. E-mail has become the frequently used communications tool to interact with professors, academic librarians, and classmates. Thus, young people might use e-mail more each week.

There is a significantly positive relationship between living in the South and e-mail use hours per week. In this study, the implication is that those who live in the South are more likely to spend more hours per week using e-mail than those in the Northeast.

The relationship between education and e-mail use hours per week is extremely significant and positive. The more educated respondents are, the more likely they are to use e-mail for more hours each week. This is consistent with the hypothesis. For each additional year of education, the hours of e-mail use will increase by .304 hour.

Household income is strongly correlated with the hours of e-mail use per week. The relationship between them is also extremely significant and positive. For each level increase in family income, the hours of e-mail use will increase by .196 hour. Education and household income are very important predictors of the hours of e-mail use every week.

There is very significant and positive relationship between private employee and the hours of e-mail use per week, which implies that the private employees are more likely to use e-mail compared to government employees. Having enough time to get one's job done has very strong impact for the hours of e-mail use per week, and strong correlation with it. Their relationship is very significant and positive, which means that those who have enough time to get the job done are more likely to use e-mail for more hours each week. This does not contradict the hypothesis. The previous research has shown gender differences in the hours of e-mail use per week. But, gender is not related to the hours of e-mail use in this study. Therefore, the hypothesis is not accepted.

## **VII. Conclusion**

This article contributes to the professional literature by examining patterns of e-mail use. The 2000-2004 General Social Survey data with adequate valid sample size allow us to examine the effects of many predictors on the hours of e-mail use. The main findings in this study show that demographic variables such as age and region, socio-economic status variables such as education and household income, and the variable of having enough time to get one's job done play significant roles in predicting patterns of e-mail use.



In this study, those with high levels of education, or higher levels of household income, or enough time to get their jobs done, or who live in the South are more likely to use e-mail for more hours each week. The older the respondents are, the less likely they are to use e-mail for more hours per week. Gender, race, and marital status make no difference.

In the context of library services, especially in academic libraries, the findings of this study are applicable to most of the patrons we serve, who are young and with higher levels of education. A manifest implication is that academic librarians should devote more to e-mail reference services.

Further study may be conducted by adding other variables such as the Internet skills and experienced computer owner/user so as to shed more light on people's email use behavior and patterns.

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<b>Appendix 1</b>		
<b>Table 1. Descriptive Statistics of Variables Used in the Analysis, U.S. Adults</b>		
Variable	Percent/Mean	S.D.
<i>Dependent Variables</i>		
E-mail hours per week	4.1	7.2
<i>Independent Variables</i>		
Age	46.3	17.4
Male	54.2%	
Race		
White	78.7%	
African-American	14.5%	
Other	6.7%	
Never Married	25.6%	
Region		
Northeast	21.4%	
Midwest	24.7%	
South	34.6%	
West	19.2%	
Years of schooling	13.4	3.0
Household income (23-point scale)	17.0 <sup>a</sup>	22.0 <sup>b</sup>
Occupational prestige score	43.9	13.9
Private employee	82.2%	
Labor force status		
Working fulltime	51.8%	
Other	48.2%	
Work arrangement at main job		
Regular, permanent employee	80.6%	

Other	19.4% %	
R has enough time to get the job done	2 <sup>a</sup>	3 <sup>b</sup>
<i>Notes:</i>		
<sup>a</sup> Median		
<sup>b</sup> Range		

## Appendix 2

**Table 2.** Estimates of Regression Models Predicting Respondents' E-mail Hours Per Week, U.S. Adults (standard error in parentheses)

Predictors	Model 1		Model 2		Model 3	
	B	$\beta$	B	$\beta$	B	$\beta$
<i>Demographic characteristics</i>						
Age	-0.036**	-0.072	-0.042**	-0.084	-0.041*	-0.065
	(0.013)		(0.013)		(0.020)	
Male	0.060	0.004	-0.261	-0.018	-0.434	-0.028
	(0.340)		(0.351)		(0.436)	
Race (White=ref.)						
African-American	-0.151	-0.007	0.143	0.006	0.511	0.022
	(0.539)		(0.551)		(0.664)	
Other	1.162	0.040	1.444*	0.052	0.891	0.029
	(0.682)		(0.682)		(0.865)	
Never married	0.026	0.002	0.612	0.038	0.223	0.013
	(0.426)		(0.445)		(0.532)	
Region (Northeast = ref.)						
Mid-west	0.140	0.008	0.321	0.020	0.248	0.014
	(0.500)		(0.509)		(0.624)	
South	0.933*	0.061	1.345**	0.089	1.500*	0.094
	(0.472)		(0.480)		(0.589)	
West	1.044*	0.059	1.041*	0.061	1.161	0.062
	(0.522)		(0.527)		(0.658)	
<i>Socio-economic status</i>						
Years of schooling			0.243***	0.092	0.304***	0.106
			(0.072)		(0.091)	
Household income			0.200***	0.133	0.196***	0.110

			(0.040)		(0.057)	
Occupational prestige			0.033	0.063	0.043*	0.079
			(0.014)		(0.018)	
<i>Employment variables</i>						
Private employee					1.567**	0.082
					(0.548)	
Labor force status						
Other					-0.543	-0.028
					(0.559)	
Work arrangement at main job						
Other					-0.519	-0.026
					(0.572)	
R has enough time to get the job done					0.692**	0.081
					(0.243)	
Constant	4.990***		-3.431**		-6.888***	
	(0.759)		(1.245)		(1.790)	
R <sup>2</sup>	0.011		0.055		0.069	
F	2.704**		8.882***		6.108***	
N	1872		1682		1261	
<i>Notes:</i>						
*p ≤ 0.05; **p ≤ 0.01; ***p ≤ 0.001 (one-tailed test)						
Source: The 2000 ?2004 General Social Survey.						

### Appendix 3

**Table 3.** Correlation Matrix for Variables Used in the Analysis, U.S. Adults (part 1)

	Email hours	Male	African-American (race)	Other (race)	Age	Midwest	South	West	Unmarried
Email hours	1.000								
Male	-.011	1.000							
African-American	.006	-.120**	1.000						
Other	0.031	-.031	-.097***	1.000					
Age	-.033	.046	-.077**	-.070**	1.000				

Midwest	-.067**	.011	-.077**	-.047*	-.087**	1.000			
South	.056*	.019	.189***	-.036	.083*	-.419**	1.000		
West	.043	-.034	-.121***	.136**	-.044	-.294**	-.363**	1.000	
Unmarried	.009	-.128**	.072**	.005	-.417**	.039	-.067*	.046*	1.000
Schooling	.158**	.028	-.076**	.009	.108**	-.066*	-.035	.048*	.023
Income	.133**	.202**	-.138***	-.009	.282**	-.084**	-.020	.034	-.333**
Prestige	.142**	.001	-.038	-.041	.114**	-.056*	.004	-.010	-.043
Private	-.072**	-.009	-.014	.019	.045	.013	-.071*	.049*	-.018
Not full-time	.041	.043	-.015	-.004	-.094**	-.047*	.026	.038	.036
Not permanent	-.043	.081*	-.042	.018	.139**	-.027	-.012	.029	-.052*
Enough time	.109**	-.019	-.077**	-.003	-.005	-.024	-.057*	.060*	-.013

Notes:

\*  $p \leq .05$  ; \*\*  $p \leq .01$  ; \*\*\*  $p \leq .001$  (one-tailed test)

Source: The 2000 ?2004 General Social Survey.

**Table 3.** Correlation Matrix for Variables Used in the Analysis, U.S. Adults (part 2)

	Email hours	Schooling	Income	Prestige	Private employee	Not full-time	Not permanent	Enough time
Email hours	1.000							
Schooling	.158**	1.000						
Income	.133**	.253***	1.000					
Prestige	.142**	.470***	.254***	1.000				
Private	-.072*	-.009	-.151**	-.099**	1.000			

	*		*	*				
Not full-time	.041	-.153***	-.032	-.225** *	.021	1.000		
Not permanent	-.043	.045	-.014	.010	.202***	.087***	1.000	
Enough time	.109** *	.133***	.080**	.153***	-.113***	-.121** *	-.128***	1.000

*Notes:*

\*  $p \leq .05$  ; \*\*  $p \leq .01$  ; \*\*\*  $p \leq .001$  (one-tailed test)

Source: The 2000 ?2004 General Social Survey.

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