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Profiling the Adopters of E-Government Information and Services

The Influence of Psychological Characteristics, Civic Mindedness, and Information Channels

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This exploratory study examines the effects of nondemographic characteristics on the adoption of e-government services in the United States combining two main theoretical perspectives: diffusion of innovations and the technology acceptance model. The results of a national survey suggest that nondemographic audience characteristics influence e-government adoption. The study adds to previous research in the area by identifying several sociopsychological characteristics that play a role in the adoption process: perceived usefulness, perceived uncertainty, and civic mindedness. The study also ascertains the influence of interpersonal communication and mass media channels on e-government adoption. Theoretical implications for future researchers and policy implications for producers of governmental web sites are discussed.

Keywords: *e-government; adoption; psychological characteristics; information channels*

The Internet has been touted as the magic technology that will improve the relationship between citizens and government and also encourage more civic engagement (e.g., Negroponete, 1995). Skeptics, however, believe that the introduction of online government will not really enhance democracy and may even exacerbate digital divide issues (e.g., Weber, Loumakis, & Bergman, 2003). Regardless of whether one favors the Internet enthusiasts or Internet skeptics, there is a clear indication that the Internet is becoming more popular in the lives of ordinary Americans. Recent statistics show that 69% of the U.S. population is online (Internet World Stats, 2004). Online government services are also becoming more popular. According to the Pew Internet & American Life Project (2004), one third of all Americans have visited a governmental web site to contact government. Furthermore, four

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out of five Internet users have gone online to either search for information from government agencies or to communicate with them. Governmental web sites are becoming “an increasingly important vehicle for citizen-initiated contacts with government” (Thomas & Streib, 2003, p. 97).

Existing studies of electronic government focus on performance by evaluating the services available on government web portals (Ho, 2002; Moon, 2002; United Nations, 2002; West, 2004). The emphasis is on online services offered by the government. The citizens' perspective, in contrast, is less researched. Few studies have made an initial inquiry into the characteristics of citizens who tend to interact with government (e.g., Pew Internet & American Life Project, 2004; Thomas & Streib, 2003).

Prior research has identified general demographic characteristics of early adopters of e-government. However, the existing profile of e-citizens is rather limited in two ways. First, little is known about the psychological characteristics of those citizens who use e-government services. These psychological characteristics have been identified as critical factors for Internet use. Second, the effect of civic mindedness has not been explored. This exploratory study provides a comprehensive conceptual framework to empirically test the effect of sociopsychological characteristics on e-government adoption.

Current Stage of E-Government Research

Broadly defined, e-government refers to the use of information and communication technologies to provide public information and services to citizens and businesses.¹ Government web sites provide a unique channel for citizen-government interaction (Thomas & Streib, 2003). Using the web for citizen-initiated contact is faster and possibly easier than calling or visiting the government office. On the other hand, the web lacks the personal contact with a government official, which is perhaps its main limitation. The use of e-government remains mostly informational at this stage and lacks interactive quality (Hart-Teeter, 2003; Steyaert, 2000).

What kinds of things do citizens do online? Among the most common online activities are paying parking tickets and filing complaints (West, 2000). This supports the proposition that personally relevant services are key for attracting users. Thomas and Streib's (2003) study of e-government adoption in the state of Georgia found that about 40% of Georgia residents had visited a government site in the past 12 months. The main reasons cited were as follows: to obtain information (64%), to get contact information (47%), to send a service request (36%), to file complaint (30%), and to express an opinion (14%). The visitors of government web sites are pleased with their experiences overall (Hart-Teeter, 2003) and tend to rank government web sites as at least as good as other web sites (Thomas & Streib, 2003). In fact, three fourths of Americans report that e-government has made it easier to stay informed about government, and two thirds say it is easier to conduct transactions with government (Hart-Teeter, 2003).

According to the Pew Internet & American Life Project (2004), the Internet is the second most popular way for Americans to contact their government. Although e-government services are becoming more common, they still seem to facilitate more information-oriented use rather than communication or two-way use (Steyaert, 2000). Most prior research has focused

on electronic government at the state level only. Another limitation of previous studies is their descriptive focus, examining the characteristics of governmental web sites while ignoring the citizens' perspective. The emphasis in prior research has been mostly on demographic profiling of e-government adopters. Below, we propose that, in addition to demographic factors, psychological factors, civic mindedness, and information channels are likely to affect online civic engagement.

Conceptual Framework

Diffusion Literature

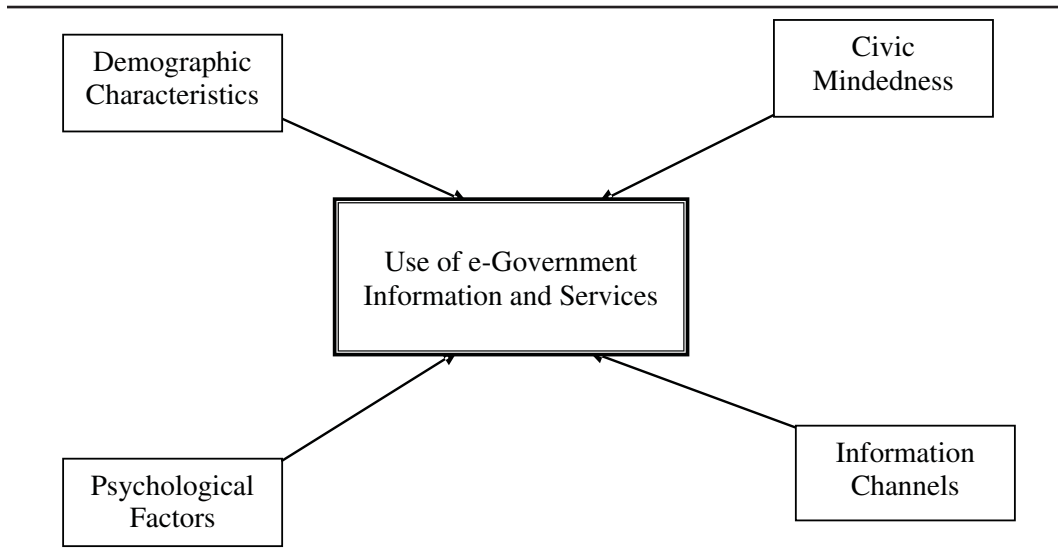
Diffusion theory was first systematically tested in the 1940s and has evolved since then, with studies focusing on the adoption of a wide range of innovations—from hybrid seed corn to new health practices to Internet services. Rogers' (1995, 2003) explication of the diffusion process is often cited by other scholars. According to Rogers (2003), an "innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. 12). Based on this definition, using online government services is a new practice and can be seen as an innovation for each individual Internet user. Diffusion of innovations theory proposes a general adoption model that includes five groups of adopters based on how early they begin to use the innovation (Rogers, 1995). The five adopter categories are: innovators, early adopters, early majority, late majority, and laggards (Rogers, 1995). Each adopter group possesses different characteristics. E-government services, as noted above, are still at the early stage of adoption in the United States. Following the diffusion of innovations categorization, those citizens who already use e-government services can be classified as early adopters.

Diffusion of innovations theory postulates that the early adopters of any innovation share some common characteristics: They are typically young and well educated and have higher incomes (Rogers, 1995). Prior research in the area of public administration has shown that citizens who use online government services already fit this description (Hart-Teeter, 2003; Pew Internet & American Life Project, 2004; Thomas & Streib, 2003). Diffusion theory, however, also posits that earlier adopters share personality traits and communication behavior, in addition to demographic characteristics (Rogers, 1995).

Technology Acceptance Model (TAM)

The TAM has been used extensively in business and management and information systems research (e.g., see Davis, 1986, 1989; Venkatesh & Davis, 2000). Even though TAM resembles the diffusion of innovations model, it puts stronger emphasis on two key factors: psychological predispositions and social influences. The TAM was developed by Fred Davis in the mid-1980s to explain computer adoption (Davis, 1986). TAM also goes beyond the demographic classification of adopters and elucidates two key psychological dimensions that play a role in the adoption process: (a) perceived usefulness and (b) perceived ease of use. According to Venkatesh and Davis (2000), perceived usefulness is "the extent to which a person believes that using the system will enhance his or her job performance" (p. 187). The TAM model proposes the following relationship between the adoption of a new technology service and this variable: The higher the perceived usefulness of the new technology, the

Figure 1
A Conceptual Framework of E-Government Adoption Determinants



more likely it is to be adopted by the consumer. This proposition points to the fact that the decision to adopt a new technology service (e.g., electronic government) is based on a subjective perception on the part of the user.

Based on diffusion literature and the TAM model, we derive the main components of the conceptual framework used in this study (see Figure 1). The sections below describe each of the four groups of determinants. We begin with demographic characteristics, followed by psychological factors, civic mindedness, and, finally, a discussion of the effect of information channels on e-government adoption.

Demographic Characteristics

Prior research on e-government has identified general demographic characteristics of citizens who use e-government services. Thomas and Streib (2003), for example, show that e-citizens tend to be (a) White, (b) of higher income, and (c) more educated than other Internet users. They also found that younger users were more likely to visit government web sites. Another report found that young adults, Whites, college graduates, and professionals were more likely to adopt e-government (Hart-Teeter, 2003). There is consensus in the e-government literature that those with higher education and higher income are more likely to use e-government information and services (Hart-Teeter, 2003; Shelley et al., 2004; Thomas & Streib, 2003).

Psychological Predispositions

Although demographic audience factors focus on objective characteristics such as age, socioeconomic status, and education, psychological audience factors refer to subjective characteristics such as personality traits and personal attitudes and beliefs. Attitudinal factors have been applied extensively in advertising and marketing research, illuminating the psy-

chological motives for individual behavior. Psychological audience factors have been shown consistently to influence media choices and adoption decisions (e.g., Dutta-Bergman, 2002; Shelley et al., 2004; Townsend, 1987). Two particular psychological variables examined in this study are perceived usefulness and perceived uncertainty.

Perceived Usefulness

Bretschneider, Gant, and Ahn (2003), in their empirical exploration of e-government service adoption, proposed three main determinants: perceived benefit, propensity to adoption, and IT technology provider. The perceived benefit factor is closely related to perceived usefulness of technology in the TAM theoretical model. Raman and Leckenby (1998) use the concept of utilitarianism to explain online behavior. Utilitarianism in their study refers to the perceived usefulness of the online content for the individual user. They found a positive relationship between utilitarianism and duration of visit of web ads. This construct, too, seems to be closely related to perceived usefulness identified in TAM. Rogers (1995), in his diffusion paradigm, also posits that the perceived benefit of the innovation positively influences adoption decisions.

Lin (2003) identified several psychological factors that influence technology adoption. One of them was the perceived need for adoption, sometimes referred to as self-actualization (Lin, 2003). It seems plausible that unless citizens perceive personal need to use e-government services, they are not likely to change their behavior. For instance, the need to file taxes quickly may serve as motivation to start using online government services. So the perceived need for the new service may be an important determinant of adoption.

Thus, we posit that perceived usefulness is a key determinant of e-government adoption. We extend the notion of perceived usefulness by developing two dimensions of this construct: perceived need, which focuses on the current need or relevance of adoption, and perceived benefit, which deals with the future outcome or benefit from adoption. We propose that both will positively affect adoption of e-government.

Hypothesis 1: Perceived usefulness of e-government services will be positively related to frequency of use of e-government services.

Hypothesis 1a: Perceived need of e-government services will be positively related to frequency of use of e-government services.

Hypothesis 1b: Perceived benefit of e-government services will be positively related to frequency of use of e-government services.

Perceived Uncertainty

We proposed above that individuals make decisions to adopt innovations based on their subjective perceptions of the value of the innovation. But are certain individuals more prone to adopting new services than are others? Lin (2003) emphasized the importance of personal risk tolerance, innovativeness, and novelty-seeking drive as predictors of technology adoption. Individuals who are less conservative and have higher risk tolerance are more likely to be early adopters of technological innovations (Lin, 2003; Rogers, 1995, 2003). Rogers's (1995) typology also shows that early adopters, who in general cope well with risk, are more likely to try out new ideas or services. One aspect of perceived uncertainty examined here is personal risk tolerance.

The second dimension of perceived uncertainty is the individual's confidence in his or her ability to use the technology in general. Lin (2003) includes the concept of self-efficacy as a predictor in the adoption process. Self-efficacy refers to the potential adopter's confidence in his or her own ability to utilize the new technology service. Higher confidence is likely to lead to faster adoption. Self-efficacy is closely related to the idea of perceived uncertainty and can serve as a predictor of adoption (Compeau & Higgins, 1995; Lin, 2003). Confidence in one's ability to use the technology will positively affect whether one begins using a new online service. In the case of the Internet, confidence is based on perceived technological expertise: Those who believe that they are competent web users may be more likely to adopt e-government.

Based on these two dimensions of perceived uncertainty, we propose the following:

Hypothesis 2: Lower perceived uncertainty will be positively related to e-government adoption.

Hypothesis 2a: Higher risk tolerance will be positively related to frequency of use of e-government services.

Hypothesis 2b: Higher technological expertise will be positively related to frequency of use of e-government services.

Civic Mindedness

Prior research on e-government suggests that e-government services provide greater convenience and flexibility to those citizens who need to use government services anyway (General Accounting Office, 2001; Pew Internet & American Life Project, 2004; Steyaert, 2000; Thomas & Streib, 2003; West, 2004). Thus, we can predict that e-government users are similar to those who use face-to-face services and are more engaged in civic affairs. In general, those citizens are likely to have more social contacts in their communities, be politically more active, and pay closer attention to the news media.

The use of electronic means by citizens to interact with government is likely to be an extension of their civic and political involvement via traditional channels. Brint and Levy (1999) argue that citizen participation in civic affairs and political activities constitutes the core aspect of civic engagement. An important part of civic engagement at the individual level is social contact. Adoption literature also identifies social contact as important in the diffusion process (Bandiera & Rasul, 2003; Lin, 2003; Lynch, Kent, & Srinivasan, 2001; Venkatesh & Davis, 2000).

Another key dimension of civic mindedness lies in individual motivation. Prior interest in and contact with government offline provides motivation for citizens to engage with government online. Some scholars have documented that media use for public affairs also contributes to civic engagement and is yet another dimension of civic mindedness (Keum, Devanathan, Deshpande, Nelson, & Shah, 2004; Skocpol & Fiorina, 1999). Although many definitions of civic mindedness exist, they encompass the following three aspects: social contact, prior interest in government, and media use for public affairs.

Hypothesis 3: Individuals with higher civic mindedness will be more likely to use e-government services.

Hypothesis 3a: Social contact will be positively related to frequency of use of e-government services.

Hypothesis 3b: Media use for public affairs will be positively related to frequency of use of e-government services.

Hypothesis 3c: Prior interest in government will be positively related to frequency of use of e-government services.

Information Channels

One of the gaps in current e-government research is the question about what information citizens use to learn about governmental web sites. Two different information channels can be used to inform them about the existence of e-government services: interpersonal channels and mass media channels. The diffusion of innovations literature posits that earlier adopters are more likely to learn about the innovation from mass media as opposed to interpersonal channels (Rogers, 1995, 2003). Thus, we propose the following:

Hypothesis 4: Mass media channels will be more important than interpersonal channels among the early adopters of e-government services.

Data and Method

An online survey of a census-balanced national sample of Internet users was conducted. The web-based survey was posted on the Internet on July 19, 2004. All responses were received 10 days after the survey was made available. Despite some limitations of web-based surveys, they are considered a viable alternative to traditional surveys (Dillman, 2000; Schonlau, Fricker, & Elliott, 2001). Online surveys are generally cheaper, faster, and more convenient and provide higher data quality than do mail surveys (Schonlau et al., 2001; Smith, 1997).

Population and Sample

The population of interest was online users in the United States. Our sample was drawn from a census-balanced list provided by the market research company Survey Sampling International, Inc.² Thus, a representative sample of the U.S. Internet population was achieved. The unit of analysis was the individual. Survey invitations were sent out via e-mail. Each e-mail assured respondents that their answers will be kept confidential and provided a link to the actual online survey. A total of 447 responses were collected. The demographic characteristics of the sample showed a wide range of age groups, education, and income levels and were comparable to Pew national telephone survey data. The comparison was done with a subset of the respondents who were Internet users (see Table 1).

The sampling and data collection techniques employed were designed to guard against the standard problems associated with web-based surveys. Online surveys have been criticized for lack of control over the number of times the same individual can take the survey (e.g., Schonlau et al., 2001). In this study, each respondent was unique (was assigned a unique ID number) and restricted from taking the survey multiple times. Another criticism of online surveys has been the fact that users can skip questions. To ensure high data quality, respondents were required by the software to answer all survey questions except the open-ended ones. Traditionally it has been difficult to verify information collected through online surveys. Therefore, we included a number of questions to get at information already collected by

Table 1
Demographic Characteristics of Survey Respondents

	Current Survey Data % ^a	Pew Survey Data % ^b
Age		
18-29	13.0	24.1
30-49	47.7	43.9
50-64	32.9	24.2
65 or older	6.5	7.7
Education		
Less than high school	1.6	3.7
High school	14.8	27.6
Some college	30.6	27.3
College degree or more	53.0	41.4
Race		
White	88.4	84.7
Other	12.6	15.3
Income		
Below \$20,000	6.9	9.3
\$20,000-\$29,999	5.4	8.6
\$30,000-\$39,999	8.5	11.3
\$40,000-\$49,999	8.3	9.9
\$50,000-\$74,999	23.5	19.7
\$75,000-\$99,999	22.1	12.4
More than \$100,000	25.2	12.6

a. $N = 447$.

b. $N = 1,899$. Pew data come from the Pew Internet & American Life Project (2004). The comparison above was made based on a subset of the Internet users from their survey.

Survey Sampling International, Inc. By matching the two data sources, we were able to further verify the validity of the data.

Variables

Following the framework outlined in Figure 1, the survey items used in this study were grouped into (a) measures of dependent variables, (b) demographic variables, (c) psychological variables, (d) civic mindedness, (e) information channels, and (f) control block variables.

Dependent Variables

The dependent variable in the present study was the level of civic engagement with online government information and services. Frequency of use of e-government information and services was gauged with questions about conducting certain activities on governmental web sites, such as getting information about voter registration or paying parking fees online. To further distinguish between use for informational purposes and use for transactions purposes or communication, two dependent variables were constructed: (a) frequency of use of e-government information and (b) frequency of use of e-government services. Several survey items were combined in an aggregated scale for each dependent variable. Likert-type scales ranging from *never* to *very often* were developed to capture the frequency of use. For infor-

mation use, respondents were asked to rank how often they conduct the following online activities on a government web site: (a) look up information on government offices or officials; (b) find information on public libraries, city or county parks and recreation, and tourism; (c) get government information on local schools; (d) seek information about public policy or issues at government web sites (environment, safety, etc.); (e) get information about elections to decide where to vote or how to vote; and (f) get information about licenses (motor vehicles, businesses, etc.). For frequency of use of e-government services, the following questions were included: how often do you (a) file taxes (state or federal income taxes), (b) purchase or renew licenses (driver's, business, hunting, fishing, and other licenses), (c) pay bills or tickets (i.e., utility bills, parking tickets), and (d) file complaints or give comments to government officials.

Independent Variables

The independent variables used in this study were grouped into five categories. First, standard demographic characteristics (age, gender, race, education level, and income) were measured. Next, respondents' psychological characteristics were assessed. Perceived need was operationalized as personal relevance of e-government services. Perceived benefit was operationalized as belief that information on governmental sites would be personally beneficial. Risk tolerance was operationalized as individual level of tolerance for uncertainty. Technological expertise was operationalized as personal belief in comfort level for Internet use. These variables were gauged with 5-point, Likert-type questions ranging from *strongly agree* to *strongly disagree*. The third set of predictors measured civic mindedness. Social contact was defined as the extent of social contact in the community. Media use was operationalized as frequency of media use for getting public affairs information. Prior interest in government was operationalized as having prior contact with government. Finally, respondents were asked to select all mass media channels (e.g., newspaper ad, TV ad, etc.) and all interpersonal channels (e.g., family, friends, coworkers, etc.) used to learn about e-government. The number of interpersonal and mass media channels was summed up in two indexes. Tables 2 and 3 contain more details about the operationalization, measurement, and distribution of the independent variables. Correlations among all independent variables are presented in Table 4.

Data Analysis

Multiple regression analyses were performed to test the hypotheses. Ordinary least squares regressions were first run on the frequency of use of e-government information and next on the frequency of use of e-government services. The results of the two models are presented in the results section as Model 1 and Model 2, respectively. Multicollinearity checks were performed.³ Factor analysis was also conducted to explore whether the empirical data reflect the theoretical grouping of variables. The results support the categories proposed in the conceptual framework.⁴

Results

The first set of hypotheses predicted that perceived usefulness would be positively related to e-government use. As shown in Table 5, perceived need is significantly related to fre-

Table 2
Operationalization of Independent Variables

Variable	Operationalization	Survey Item
Perceived need	Personal relevance of e-government services	Being able to conduct information searches and transactions with government online is important for me. 5-point scale (<i>strongly agree</i> to <i>strongly disagree</i>)
Perceived benefit	Belief that information on governmental sites is personally beneficial	I benefit significantly from online information and services available from government web sites. 5-point scale (<i>strongly agree</i> to <i>strongly disagree</i>)
Risk tolerance	Level of tolerance for uncertainty	Personally, I do not cope with uncertainty very well. 5-point scale (<i>strongly agree</i> to <i>strongly disagree</i>)
Technological expertise	Personal belief in comfort level for using the Internet	Which of the following best describes how comfortable you are with using the Web? 3-point scale (<i>very comfortable</i> to <i>not very comfortable</i>)
Interpersonal channels	Number of interpersonal channels to find out about e-government	Who has introduced you to the use of government web sites? Select all that apply (friends, family members, coworkers, governmental officials, and businesses). Summation of interpersonal channels
Mass media channels	Number of mass media channels to find out about e-government	Select all mass media channels you have used to learn about e-government (e.g., newspaper ad, TV ad, etc.). Summation of all mass media channels
Frequency of Internet use	Number of hours spent online	How many hours a week, on average, do you spend online? Options: 0-2 hours, 3-5 hours, 6-8 hours, 9-11 hours, more than 11 hours
Social contact	Extent of social contacts in community	I have many social contacts with people in my community. 5-point scale (<i>strongly agree</i> to <i>strongly disagree</i>)
Media use for public affairs	Frequency of media use for getting public affairs information	How often do you read newspapers to learn about government or get public affairs information? 5-point scale (<i>very often</i> to <i>never</i>)
Prior interest in government	Previous contact with government	How often have you contacted government officials in the past? 5-point scale (<i>very often</i> to <i>never</i>)

quency of use of e-government in Model 1 but not in Model 2. Perceived benefit is statistically significant in both Model 1 and Model 2. Thus, Hypotheses 1a and 1b are generally supported. A post hoc analysis revealed, however, that perceived need and perceived benefit are strongly correlated and measure the same construct.⁵

The second set of hypotheses involved psychological characteristics for each individual Internet user. The results shown in Table 5 indicate that personal risk tolerance is significantly related to e-government adoption for transactional purposes but not for information

Table 3
Distribution of Dependent and Independent Variables

Variable	Min	Max	<i>M</i>	<i>SD</i>
Frequency of use of e-government information	6	30	15.05	4.859
Frequency of use of e-government services	4	20	8.97	4.035
Perceived need	1	5	3.38	0.949
Perceived benefit	1	5	3.43	0.945
Risk tolerance	1	5	2.62	1.028
Technological expertise	1	3	2.76	0.453
Interpersonal channels	0	5	0.69	0.960
Mass media channels	0	8	2.00	1.461
Frequency of Internet use	1	5	4.04	1.198
Social contact	1	5	3.27	1.074
Media use for public affairs	1	5	3.48	1.234
Prior interest in government	1	5	2.35	1.078

use. Technological expertise shows the reverse: It is statistically significant in Model 1 but not in Model 2. Thus, Hypotheses 2a and 2b are partially supported.

Hypothesis 3 predicted that higher civic mindedness would be positively related to e-government adoption. The results provide partial support for this hypothesis also. The beta coefficient for social contact in Model 1 is positive and statistically significant. The variable, however, is not significant in Model 2, suggesting that the influence of social contact is reduced once e-government users become more sophisticated. Prior interest in government is significant in both models. The parameters for media use for public affairs, however, are not significant.

The last hypothesis stated that mass media channels would be more important than interpersonal channels among the early adopters of e-government. This hypothesis was supported in both models. At this stage of e-government adoption, mass media channels seem to be more effective compared with interpersonal channels in creating awareness.

The overall *R*-squared for the first regression model, using the frequency of use of e-government for information purposes as the dependent variable, was .50. It is important to note another strength of this model: All predictor variables contributed independently to explaining e-government use. In the second model, we regressed the same variables on frequency of use of e-government for transactional purposes. As suggested by the literature, this stage of adoption usually follows initial informational use. The explanatory power of the second model is lower, but the *F* value remains statistically significant.

Discussion

Profiling the Adopters of E-Government

The integrative conceptual framework proposed here allowed us to capture the effects of several factors of e-government adoption. As expected, demographic factors were significantly related to citizens' engagement online. Income was positively related to use of online

Table 4
Correlations Table

Variable	Age	Gender	Education	Income	Race	Perceived Need	Perceived Benefit	Risk Tolerance	Technological Expertise	Interpersonal Channels	Mass Media Channels	Frequency of Internet Use	Social Contact	Media Use for Public Affairs
Gender	.202**													
Education	.145**	.111*												
Income	.221**	-.039	.405*											
Race	.068	-.002	.027	.042										
Perceived need	.103*	.145**	.115*	.043	-.142**									
Perceived benefit	.079	.104*	.090	.047	-.103*	.777**								
Risk tolerance	-.125**	-.168**	-.018	-.057	-.047	.058	.019							
Technological expertise	-.168**	-.002	.054	.143**	-.053	.098*	.182**	-.082						
Interpersonal channels	-.049	.061	.047	.036	-.036	.195**	.176**	-.076	.011					
Mass media channels	.175**	.072	-.051	-.003	-.125**	.247**	.225**	.024	.046	.132**				
Frequency of Internet use	.164**	.14**	.048	.045	.025	.256**	.267**	.006	.143**	-.010	.146**			
Social contact	.093*	-.064	.106*	.171**	-.052	.180**	.184**	-.119*	.138**	.139**	.165**	.066		
Media use for public affairs	.287**	.10*	.14**	.206**	-.012	.177**	.152**	-.108*	-.023	.130**	.178**	.032	.281**	
Prior interest in government	.249**	.212**	.201**	.104*	-.076	.444**	.387**	-.061	.067	.169**	.183**	.195**	.272**	.261**

Note: The table presents Pearson correlations among the independent variables in the regression.
* $p < .05$. ** $p < .01$.

Table 5
Regression Results

Variable	Model 1		Model 2	
	β	<i>SE</i>	β	<i>SE</i>
Constant	-0.35	1.628	0.61	1.686
Age	-0.05***	0.015	-0.04**	0.015
Gender	0.10	0.369	0.31	0.383
Education	-0.15	0.131	-0.28*	0.136
Income	0.07	0.082	0.24**	0.085
Race	-0.97*	0.527	0.22	0.543
Perceived need	1.17***	0.287	0.55	0.301
Perceived benefit	1.52***	0.284	0.59*	0.294
Risk tolerance	0.30	0.168	0.37*	0.173
Technological expertise	0.94*	0.395	0.71	0.407
Interpersonal channels	0.26	0.180	-0.09	0.186
Mass media channels	0.51***	0.122	0.27*	0.126
Frequency of Internet use	0.21	0.148	0.04	0.153
Social contact	0.77***	0.168	0.21	0.176
Media use for public affairs	0.44	0.149	-0.11	0.154
Prior interest in government	1.27***	0.173	0.83***	0.191
Model summary				
R^2	.50		.24	
Adjusted R^2	.49		.21	
F	30.88***		8.81***	
N	447		447	

Note: The table presents ordinary least squares estimates. Unstandardized beta coefficients and standard errors are reported. Model 1 is based on frequency of use of e-government information as the dependent variable, whereas Model 2 is based on frequency of use of e-government services as the dependent variable.

* $p < .05$. ** $p < .01$. *** $p < .001$.

government services. Age was negatively related to adoption. These findings have been supported in prior studies (e.g., Hart-Teeter, 2003; Thomas & Streib, 2003).

Also consistent with previous e-government research, this exploratory study found that a substantial number of Internet users have not used e-government for communication or transactions but have done so for information. Almost half of our respondents have never purchased or renewed their license online. In contrast, only 7% have never visited government web sites to locate recreation or tourism information, and about 20% have never sought information on public policy issues (e.g., environment).

Perceptions of E-Government Services

A key finding in our study was the relationship between perceived usefulness and e-government adoption. Choosing to adopt e-government services—for instance, to file taxes online—is rooted in the perceived usefulness of the governmental web site. Therefore, government officials trying to promote their web sites need to target particular groups of citizens—those who indeed may benefit more from online services (e.g., frequent travelers). These findings provide support for the technology acceptance model.

The importance of perceived usefulness was also supported by our open-ended question about reasons for nonadoption. The answers revealed that nonadopters generally believe governmental web sites do not offer anything relevant for them: “No need for me to use governmental web sites,” “Never felt the need,” “No reason to do so.” We also identified a few skeptics concerned about privacy and security of online information. In fact, almost one fourth said that any information on the Internet raises privacy issues. Although that was not the main focus of this study, such negative perceptions should be explored in future research.

Going Beyond Demographics

Much prior research has narrowly focused on the objective characterization of e-government users. Here we attempted to add psychological factors—that is, subjective characteristics of the audience, which have been used extensively in advertising and marketing (e.g., Dutta-Bergman, 2002; Townsend, 1987). The findings above show that, indeed, personal attitudes toward uncertainty affect adoption. On a theoretical level, this supports Rogers’s (1995) diffusion of innovations paradigm and its profile of early adopters.

Surprisingly, perceived risk tolerance was only significant for transactional use. The most plausible reason is that respondents are more concerned with conducting online transactions as opposed to simply downloading e-government information. Future studies may also employ a different measure of risk tolerance that assesses risk directly associated with online transactions. It seems desirable to introduce policies that reduce uncertainty—perhaps providing free tutorials on how to upload documents or personal information through governmental web sites.

Reaching Potential Adopters

The results of this study shed some light into possible ways to encourage citizens to visit governmental web sites. Our findings suggest that mass media channels are more influential than are interpersonal channels, especially at this early e-government adoption stage. This is consistent with diffusion theory (Rogers, 2003). The results imply that government officials should use mass media advertising as a successful method for reaching potential adopters of their online services. Some states have already adopted such a strategy. For example, the state of Indiana has aired stories about their official state web portal on the radio. Another novel use of advertising by the state of Indiana is printing its web address on license plates for mobile advertising.

Limitations and Avenues of Future Studies

The sample used in this study does not represent the general U.S. population. Generalizations of the findings to the general population should be made with caution, and this study should be viewed as exploratory. Future studies using the theoretical framework of this research should reach the general U.S. population. For that purpose, telephone interviews will be a preferred method of data collection.

Another avenue of future research is to explore further the concept of civic mindedness. The current study also does not differentiate various social networks to which respondents belong. Knowing which network serves a primary role in shaping adoption decisions

will offer both theoretical and policy insights into the provision and consumption of e-government information and services.

Conclusion

This exploratory study proposed a multidimensional theoretical framework combining diffusion of innovations and the technology adoption model to explain e-government adoption in the United States. A number of determinants were proposed and tested, going beyond the traditional demographic profiling of e-government users. The main conclusion is that sociopsychological factors affect e-government adoption. Perceived usefulness, perceived uncertainty, and prior interest in government are related to being an active user of e-government.

This study has important policy implications. Government needs to be sensitive to what citizens perceive as the benefits of online information and services. Moreover, disseminating information about existing e-government information and services would be best achieved through mass media channels at this stage of adoption.

Notes

1. This definition is consistent with the broad definition forwarded by the United Nations and the American Society for Public Administration: "E-government can include virtually all information and communication technology (ICT) platforms and applications in use by the public sector" (United Nations, 2002, p. 1). Other definitions tend to have a narrower focus, typically dealing with Internet technologies (General Accounting Office, 2001).

2. A professional survey company, Survey Sampling International, Inc., was hired to achieve a large, census-balanced national sample targeting gender balance. Recontact was not allowed because of company policy. The response rate was 9%, which is comparable to similar web surveys and acceptable for exploratory analysis (e.g., see Comley, 1996; Schonlau, Fricker, & Elliott, 2001; Smith, 1997). Higher response rates are often related to convenience samples or surveying census populations. In this study, a representative national sample was targeted, and sampling error was minimal. Comparison between respondents and nonrespondents revealed that they did not differ significantly across basic demographic characteristics such as education and income. Thus, the 9% response rate is considered acceptable given the exploratory nature of our study and the representativeness of the sample of the general Internet population.

3. The researchers checked for multicollinearity that may affect the validity of using the ordinary least squares. With regard to multicollinearity, both models do not appear to have any problems. First, correlation coefficients for all independent variables are below .7. A correlation coefficient that is above .7 is likely to have a serious collinearity problem. Second, all variance inflation factors (VIF) are slightly greater than 1 and are well below 10. Only when the largest VIF is greater than 10 is there a concern for multicollinearity (Bowerman & O'Connell, 1990). Third, tolerance numbers are in the range of 0.6 and 1.0. This is well above 0.2, a number below which would indicate a potential problem (Menard, 1995).

4. The study used the principal component method with varimax rotation to determine the factor loadings for each variable on a component. The independent variables that belong to the same conceptual category such as psychological characteristics generally have high loadings on the same component. The results of the exploratory factor analysis are not presented here for brevity.

5. Perceived need and perceived benefit were included in a reliability analysis to check for uni-dimensionality. An alpha score of .875 indicates that they reflect the same conceptual construct.

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