Provided for non-commercial research and education use.
Not for reproduction, distribution or commercial use.

This article appeared in a journal published by Elsevier. The attached copy is furnished to the author for internal non-commercial research and education use, including for instruction at the authors institution and sharing with colleagues.

Other uses, including reproduction and distribution, or selling or licensing copies, or posting to personal, institutional or third party websites are prohibited.

In most cases authors are permitted to post their version of the article (e.g. in Word or Tex form) to their personal website or institutional repository. Authors requiring further information regarding Elsevier's archiving and manuscript policies are encouraged to visit:

http://www.elsevier.com/copyright

Author's personal copy

Computers in Human Behavior 26 (2010) 1674–1684

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

Age differences in perceptions of online community participation among non-users: An extension of the Technology Acceptance Model

Jae Eun Chung [a,*], Namkee Park [b,1], Hua Wang [c,2], Janet Fulk [d,3], Margaret McLaughlin [d,4]

[a] School of Communication Studies, Kent State University, Taylor Hall, Kent, OH 44242, USA
[b] Gaylord College of Journalism and Mass Communication, University of Oklahoma, 395 W. Lindsey St., Norman, OK 73019, USA
[c] Department of Communication, University at Buffalo, The State University of New York, 359 Baldy Hall, Buffalo, NY 14260-1020, USA
[d] School of Communication, Annenberg School for Communication, University of Southern California, 3502 Watt Way, Los Angeles, CA 90089-2081, USA

ARTICLE INFO

Article history:
Available online 22 July 2010

Keywords:
Online community
Technology Acceptance Model
Generation gap
Older adults

ABSTRACT

This study examined age differences in perceptions of online communities held by people who were not yet participating in these relatively new social spaces. Using the Technology Acceptance Model (TAM), we investigated the factors that affect future intention to participate in online communities. Our results supported the proposition that perceived usefulness positively affects behavioral intention, yet it was determined that perceived ease of use was not a significant predictor of perceived usefulness. The study also discovered negative relationships between age and Internet self-efficacy and the perceived quality of online community websites. However, the moderating role of age was not found. The findings suggest that the relationships among perceived ease of use, perceived usefulness, and intention to participate in online communities do not change with age. Theoretical and practical implications and limitations were discussed.

© 2010 Elsevier Ltd. All rights reserved.

1. Introduction

Older adults are the fastest growing users of the Internet in the United States. Internet users aged 55 and above now represent about a quarter of the Internet user population in the U.S., and their access to home broadband has more than doubled between 2005 and 2008 (Jones & Fox, 2009). The number of older adults in America will keep soaring over the next ten years as the baby boomers enter their 50s and 60s. Predominantly consumed by youth in the past decade, the Internet is increasingly being incorporated into the everyday routines of older adults. Yet, younger and older adult users may use the Internet very differently. For example, older adults are more likely to seek health information, make purchases, and obtain religious information, but less likely to watch videos, download music, play games, and read blogs online (Jones & Fox, 2009). Moreover, when it comes to participating in online communities, older adults could make up a user group with distinct characteristics of online behavior such as being more interactive with other members and more loyal to their communities (Zaphiris & Rifaht, 2006). However, much is to be learned about the perceptions that older Internet users hold toward the Internet and online communities and how those perceptions would influence their decisions of engaging in these online communities in the future.

Several online communities focus on older Internet users (White, 2008). A study of SeniorNet, one popular online community dedicated to older adults, suggests that online communities can serve as a resource for them to establish social networks, gain information, share thoughts and experiences, and exchange various kinds of support (Nahm, Resnick, & Mills, 2003). Participation in online communities can be especially important for the elderly, who may experience shrinkage of social networks (Cumming & Henry, 1961) and difficulty with mobility. Despite online communities' potential positive contribution by serving as another resource for older adults and their well-being, issues related to online communities and older adults to date have received little scholarly attention (Jaeger & Xie, 2009).

A number of researchers and organizations have suggested guidelines for creating senior-friendly websites (Arch, 2008). Some online communities geared toward older adults have simplified the design of their sites in order to enhance their look and usability for older adults (Solomon, 2009). Although such design enhancement is one strategy through which an online community can appeal to a larger number of members, there are other attitudinal and perceptual factors that are associated with online community participation (Hernández-Encuentra, Pousada, & Gomez-Zuniga, 2009). Older adults may hold different perceptions of online communities

* Corresponding author. Tel.: +1 213 821 2445.
E-mail addresses: jchung3@kent.edu (J.E. Chung), npark@ou.edu (N. Park), wanghua@usc.edu (H. Wang), fulk@usc.edu (J. Fulk), mmclaugh@usc.edu (M. McLaughlin).
[1] Tel.: +1 405 325 7034.
[2] Tel.: +1 626 315 7362.
[3] Tel.: +1 213 740 0941.
[4] Tel.: +1 213 740 3938.

0747-5632/$ - see front matter © 2010 Elsevier Ltd. All rights reserved.
doi:10.1016/j.chb.2010.06.016

Author's personal copy

compared to younger adults, and understanding of such different perceptions and expectations is essential for online communities to provide better design and features. Therefore, this study seeks to understand whether there are differences between generations in terms of their perceptions of online communities and examine whether any differences in such perceptions will in turn influence future intention to participate in online communities.

In order to investigate any age-related differences in perceptions and intention to participate in online communities, this study employs the Technology Acceptance Model (TAM; Davis, 1986). The model was selected as a theoretical framework because it explains and predicts how an individual decides to adopt a new technology. Based upon the theory of reasoned action (TRA: Fishbein & Ajzen, 1975) and the theory of planned behavior (TPB: Ajzen & Fishbein, 1980; Ajzen, 1991), the model has been extensively used, tested, and refined for adoption of many technologies (Bagozzi, 2007; Sun & Zhang, 2006; Yousafzai, Foxall, & Pallister, 2007a). It should be noted, however, that there have been some arguments against the theoretical contributions of the model to explain technology adoption, use, or rejection. For instance, Bagozzi (2007) claimed that the TAM's emphasis on its two key variables (i.e., perceived usefulness [PU] and perceived ease of use [PEOU]) has kept researchers from delving into other essential determinants of technology adoption decisions. Further, he argued that there have been too many antecedents and moderators of PU and PEOU, which in turn makes model development almost impossible. Similarly, Benbasat and Barki (2007) claimed that studies have replicated the validity of PU, yet those studies neglected the factors that actually make the technology in question useful. Faced with these criticisms, Straub and Burton-Jones (2007) suggested meta-analyses as a way to refine the various constructs proposed in previous TAM studies, while Goodhue (2007) argued that the TAM is still a valuable model in that it has accumulated a body of research about technology adoption in a sophisticated and compelling fashion. In addition, acknowledging a continuation of replications with no substantial theoretical advance, Venkatesh, Davis, and Morris (2007) suggested that comparisons of competing models can nurture the TAM with opportunities to be a more theoretically-driven framework. Given these contrasting perspectives toward the TAM, this study seeks to test the applicability of the model in the context of online community participation.

The objectives of this study are threefold. First, this study applies the TAM to the context of online community participation and tests its validity in an online application. Second, this study examines the relationship of Internet users' age to perceptions of online communities and their future likelihood of participation. Third, it extends the TAM by including age as a moderator and explores the moderating role of age in the process of predicting the intention of future participation. Although age has been included as a moderator in some TAM studies or meta-analyses of the TAM (e.g., King & He, 2007; Sun & Zhang, 2006; Venkatesh, Morris, Davis, & Davis, 2003; Yousafzai, Foxall, & Pallister, 2007b) and it was found to have a significant impact on future intention of technology adoption and use, this study examines the role of age in predicting perceptions and future intention of online community participation among non-users.

2. Research framework: the Technology Acceptance Model and age as a moderator

The TAM is composed of three key variables: PEOU, PU, and potential users' behavioral intention (BI) to adopt the technology in question. A meta-analysis has shown the robustness of paths from PEOU to PU and from PU to BI (Sun & Zhang, 2006). The model also includes external and antecedent factors that affect the two key variables, PEOU and PU. During the past two decades, more than seventy different variables have been proposed as antecedents of PEOU and PU (Yousafzai et al., 2007a). The evolution and summaries of previous empirical findings are well presented in a meta-analysis conducted by Lee, Kozar, and Larsen (2003).

As the use of the Internet is by its nature intentional (Rayburn, 1996), the use of the TAM framework fits the purposes of this study. A number of studies have used the TAM to understand technology adoption decisions involving the Internet (e.g., Moon & Kim, 2001) and online applications, including e-mail (e.g., Adams, Nelson, & Todd, 1992; Chin, Marcolin, & Newsted, 2003; Gefen & Straub, 1997), e-learning (e.g., Lee, 2006; Park, Lee, & Cheong, 2007; Walker & Johnson, 2008), e-health (e.g., Lanseng & Andreassen, 2007), and e-government (e.g., Phang et al., 2006; Wangpipatwong, Chutimaskul, & Papasratorn, 2008). However, the TAM has been tested with little attention to moderating factors (Sun & Zhang, 2006; Yousafzai et al., 2007a, 2007b). Although a few studies called for the need to collect data on potential moderators and criticized the lack of analysis of moderating effects (Adams et al., 1992; Agarwal & Karahanna, 2000; Lucas & Spitler, 1999), studies that employed the TAM rarely included moderators. Only a few studies incorporated moderators and found a significant role of moderating factors in the TAM (Gefen & Straub, 1997; Sun & Zhang, 2006; Venkatesh et al., 2003). Moderators that have been suggested but remain largely untested include individual factors (e.g., gender, age, experience, intellectual capacity, and cultural background), technology factors (e.g., purpose and complexity), and organizational factors (e.g., voluntariness and profession). Sun and Zhang (2006) explained that inclusion of moderators could help improve explanatory power of the model and overcome inconsistencies of relationships among key variables found in previous studies.

In particular, the effect of age on the TAM has received little attention (Sun & Zhang, 2006) although abundant research suggests its significant role in decisions about technology adoption (e.g., Akhter, 2003; Porter & Donthu, 2006) and many scholars have emphasized the danger of an increasing digital divide between generations (e.g., Paul & Stegbauer, 2005). Therefore, using age as a moderator of the TAM, this study highlights age-related differences in perceptions of one of the newer Internet applications, online communities, emphasizing possibly different requirements for increased participation in online communities by different age groups.

3. Hypothesis development

This study seeks to better understand perceptual and attitudinal factors that could facilitate participation in online communities and thus introduces four external variables: Internet self-efficacy, perceived quality of online community websites, perceived technology affordances of online communities, and perceived privacy protection in online communities. We propose that age differences have effects on these four external variables, PEOU, PU, and BI and hypothesize that age will moderate the relationships with respect to the paths from PEOU and PU to BI.

3.1. Internet self-efficacy

Social cognitive theory asserts that individuals are more likely to engage in a particular behavior if they believe that they have the capability to perform the behavior (Bandura, 1997). The specific form relevant to research on online behaviors is Internet self-efficacy, an individual's self-perceived confidence in using the Internet to successfully perform tasks (Eastin & LaRose, 2000). This construct focuses on the judgment of one's capability of finding specific information online or troubleshooting Internet

Author's personal copy

search problems (Eastin & LaRose, 2000). Internet self-efficacy has found to be a significant predictor of PEOU in the context of online shopping (Eastin, 2002), e-learning (Roca, Chiu, & Martínez, 2006), and Internet phone service (Park, 2010).

With respect to age differences in Internet self-efficacy, older adults often think that they are too old to learn a new technology (Turner, Turner, & Van de Walle, 2007) and have low self-efficacy in its use (Czaja et al., 2006). Prior studies have found a positive relationship between age and perceived difficulty of learning a new software application (Morris & Venkatesh, 2000; Morris, Venkatesh, & Ackerman, 2005). There is also ample evidence that older adults have higher levels of computer anxiety than their younger counterparts (Chaffin & Harlow, 2005; Laguna & Babcock, 1997; Saunders, 2004) and that higher levels of computer anxiety are associated with greater reluctance to engage in opportunities to learn new Internet skills (Jung et al., 2010). Thus, we propose the following hypotheses:

H1a. Internet self-efficacy will be positively associated with perceived ease of use of online communities.

H1b. Among adults, age is negatively associated with Internet self-efficacy.

3.2. Perceived quality of online community sites

Poor online community infrastructure increases communication costs and constrains user participation (Koh, Kim, Butler, & Bock, 2007). On the other hand, features of a high-quality community website such as system reliability, a user-friendly interface, and easy navigation can increase the frequency of visits and enhance the level of participation (Barnes & Vidgen, 2003; Belanger et al., 2006; Kim, 2000). The success of a specific technology is often closely related to the quality of information and services it provides (DeLone & McLean, 1992). Lin (2008) also found a significant influence of system quality in virtual communities on both PEOU and PU. Similarly, Liaw and Huang (2003) found a positive impact of perceived quality on both PEOU and PU in Internet search engines, while Park (2010) also discovered positive associations between perceived quality and both PEOU and PU in the context of computer-based VoIP phone service.

With respect to age differences in perceived quality, it is expected that younger adults who are generally more technology-savvy are more likely to appreciate the quality of site features, functions, and designs than older adults. Compared to younger adults, older adults may take longer to learn the ways in which online communities can serve their participants and may not easily recognize the overall quality of online community sites. Older adults often have a relatively shorter history of Internet use and need more time in learning the benefits of using new technologies (Morris & Venkatesh, 2000; Morris et al., 2005). Thus, the following hypotheses were proposed:

H2. Perceived quality of online community sites will be positively associated with (a) perceived ease of use and (b) perceived usefulness of online communities.

H2c. Among adults, age is negatively associated with perceived quality of online community sites.

3.3. Perceived technology affordances

People evaluate a new technology not only in terms of its technical quality but also in terms of the functions it enables (Norman, 1988). This notion of technology affordances (Bradner, 2001; Norman, 1988) emphasizes the importance of people's perception of new opportunities or potential benefits a specific technology provides. For example, in the case of pay-per-view service, LaRose and Atkin (1991) found that people's adoption intention was most strongly associated with their perception that the service would afford possibilities that were unavailable on conventional television channels, such as absence of commercials and convenient access.

Online communities also provide unique and valuable social functions. Mynatt, O'Day, Adler, and Ito (1998) and Ruhleder (2002) detailed functions online communities afford and their importance for online community participants. It is expected that those who value the functions online communities afford would hold more positive views toward online communities, thus having greater degrees of PEOU and PU. In addition, younger adults are expected to be more active than older adults in making use of diverse functions and features online communities afford. Interviews with older adults revealed that they have a tendency to use the Internet for a rather specific goal and function, although the Internet affords a wide range of activities (Lepa & Tatnall, 2006). Thus, the following hypotheses were suggested:

H3. Perceived technology affordances of online communities will be positively associated with (a) perceived ease of use and (b) perceived usefulness of online communities.

H3c. Among adults, age is negatively associated with perceived technology affordances of online communities.

3.4. Perceived privacy protection

Privacy on the Internet has been an important issue for people who engage in online activities (Paine, Reips, Stieger, Joinson, & Buchanan, 2007). Internet users often reveal personal information to anonymous strangers, yet they still hope their personal information will be safe and secure. For instance, there were numerous complaints about the Facebook privacy policy when it was reported that people might not be able to have their personal information completely removed (Aspan, 2008). Thus, perceived privacy protection can significantly influence PU of online communities. For example, the perception of whether individual data could be safely stored within an online system had been shown to significantly affect the adoption decision of the online system (e.g., Lee, Braynov, & Rao, 2003; Phang et al., 2006).

Younger adults do not expect online privacy to work in the same way as older adults do (Kornblum, 2007). Abril (2007) argued that younger and older generations hold fundamentally different conceptions of online privacy. Young people, who have grown up with Internet technology, are less concerned about online privacy (Kornblum, 2007). Thus, we suggest the following hypotheses:

H4a. Perceived privacy protection in online communities will be positively associated with perceived usefulness of online communities.

H4b. Among adults, age is negatively associated with perceived privacy protection in online communities.

3.5. Perceived ease of use

The causal linkage from PEOU to PU has been repeatedly validated (e.g., Davis, 1986; Davis, Bagozzi, & Warshaw, 1989; Park, 2010; Park et al., 2007; Park, Roman, Lee, & Chung, 2009; Venkatesh, 1999). Although the original TAM included PEOU only

Author's personal copy

as an indirect determinant of BI (Davis, 1989), empirical studies have found evidence for a direct path from PEOU to BI (e.g., Horton, Buck, Waterson, & Clegg, 2001; Venkatesh & Davis, 1996, 2000). Thus, it is expected that PEOU will positively affect both PU and BI.

With respect to age differences, it is expected that younger adults are more likely to perceive that online communities are easy to use, given that they are more familiar with and oriented to new communication technologies compared to older adults. A number of physical changes associated with the aging process, such as decline in sensory and motor skills, cause delays in learning of web skills (Van de Watering, 2007). Even when the level of computer and Internet experience is controlled for, older adults experience significantly more usability issues on the Internet than younger adults (Chadwick-Dias, McNulty, & Tullis, 2003).

Such usability issues are also more critical to older adults than younger adults in the assessment of the perceived usefulness of a new technology. For example, in an empirical study about the adoption of Personal Digital Assistant (PDA), ease of use was a more powerful predictor of perceived usefulness for older adults than younger adults (Arning & Ziefle, 2007). When it comes to a decision of whether or not to adopt a new technological device, younger adults delineated a greater number of factors, such as its price and its iconic role as status symbol, other than its ease of use, whereas older adults were affected to a greater degree by its ease of use (Arning & Ziefle, 2007). For young people who learn a new technology more easily, the adoption decision is less likely to be driven by its perceived difficulty or ease of use. Thus, we hypothesized that both PEOU–PU and PEOU–BI relationships would be moderated by age, such that the effect from PEOU would be stronger for older adults:

H5. Perceived ease of use will be positively associated with (a) perceived usefulness of online communities and (b) behavioral intention to participate in online communities.

H5c. Among adults, age is negatively associated with perceived ease of use of online communities.

H5d. The relationship between perceived ease of use and perceived usefulness of online communities is moderated by age such that the relationship will be stronger among older adults than younger adults.

H5e. The relationship between perceived ease of use and behavioral intention to participate in online communities is moderated by age such that the relationship will be stronger among older adults than younger adults.

3.6. Perceived usefulness

Like the path from PEOU to PU, empirical studies are abundant that support the path from PU to BI (e.g., Davis et al., 1989; Hu, Chau, Sheng, & Tam, 1999; Park, 2010; Park et al., 2007, 2009; Venkatesh, 1999). All other things being equal, a new technology is more likely to be adopted when it is considered to be useful or effective in achieving a goal. As one important element for the survival of online communities is the provision of useful content, perceived usefulness is one core construct to examine in the study of the online community participation decision (Koh et al., 2007).

With respect to age differences, it is expected that younger adults are more likely to perceive online communities as useful. Previous research demonstrated that younger adults compared to older adults place greater importance on the extrinsic value of a new technology and pay closer attention to performance-related rewards, thus being more strongly affected by instrumentality of the new technology (Hall & Mansfield, 1975). The perception that a new technology is useful and functional is also likely to affect the adoption decision to a greater degree for younger adults (Sun & Zhang, 2006; Venkatesh et al., 2003). Although perceived benefits and functionalities are also critical to older adults' adoption decision (Hernández-Encuentra et al., 2009), older adults tend to be less autonomous in their technological decision and more strongly influenced by social and psychological factors, such that their decision to participate in online communities largely follows their children's and grandchildren's participation in online communities (Clifford, 2009; Jayson, 2009). Thus, the following set of hypotheses was proposed:

H6a. Perceived usefulness will be positively associated with behavioral intention to participate in online communities.

H6b. Among adults, age is negatively associated with perceived usefulness of online communities.

H6c. The relationship between perceived usefulness and behavioral intention to participate in online communities is moderated by age such that the relationship will be stronger among younger adults compared to older adults.

3.7. Behavioral intention to participate

A considerable number of studies have found that younger adults have greater intention to adopt new technologies compared to older adults (Morris & Venkatesh, 2000; Morris et al., 2005). Older adults are often slower in adjusting to technological changes as habits become stronger with age (Harrison & Rainer, 1992; Majchrzak & Cotton, 1988). Modahl (1999) suggests that older adults are less likely to adopt a new technology due to a skeptical attitude toward technology compared to their younger counterparts. Similarly, older adults are more reluctant to try out new technologies (Gilly & Zeithaml, 1985; Phillips & Sternthal, 1977) and purchase new technological devices (Huh & Kim, 2008). Therefore, older adults' intention to use new technologies and services are expected to be lower than their younger counterparts. Thus, the following hypothesis was proposed:

H7. Among adults, age is negatively associated with behavioral intention to participate in online communities.

4. Method

4.1. Sampling and survey administration

An online survey was employed to test the hypotheses. Despite some weaknesses of online surveys (see Sheehan, 2001; Smith, 1997; Thompson, Surface, Martin, & Sanders, 2003), the fact that Internet connection and use are required for any potential members of an online community makes it appropriate to use an online survey for data collection. This study collected data from an online panel provided by the Media Research Lab at the University of Texas at Austin. The panel includes more than 20,000 respondents who were recruited from collaborative agreements between high traffic websites and the Media Research Lab. The panel members need to be at least 18 years of age to register, but they may permanently opt out of the panel at any time. In order to limit each panelist's participation to a reasonable number of survey studies, the panel database keeps track of panelists' history of participation. Depending on the requested sample size of a specific study, a

Author's personal copy

panelist pool is randomly selected. When a sufficient number of participants cannot be obtained, another panelist pool can be accessed (Daugherty, 2007).

Data for this study were collected in June and July 2008. The web-based questionnaire was administered via Qualtrics.com. An e-mail announcement was sent to 8935 panelists with a hyperlink to directly access the survey. Of that number, 989 (11.1%) participated in the survey and about a half (452) were non-users of online communities who constituted our final sample in this study. All participants were offered an incentive of being eligible for a $500 cash prize drawing administered by the Media Research Lab.

4.2. Measurement

All of the following measures were pilot tested in spring 2008 with a sample of undergraduate students. Some items were revised after reliability check and the final items are listed in the Appendix A. All items, except for age and behavioral intention to participate, were measured by a 5-point Likert scale ranging from "strongly disagree" to "strongly agree," unless otherwise indicated. Before proceeding to questions on online communities, respondents were given a definition of online communities: a group of people that share thoughts, ideas, or work on common projects, which does not exist offline. The question on the future intention to participate in online communities was also preceded by explanation of what constitutes participation in online communities: becoming a member of an online community, visiting an online community website on a regular basis, and/or actively taking part in the events and activities of an online community.

Age was measured by asking participants to provide their age in years. *Internet self-efficacy* was measured with items from a scale developed by Hsu and Chiu (2004). Given time and space limitations, we selected ten items of the original 19 which had the highest factor loadings ($\alpha = .85$). *Perceived quality of online community sites* was an index composed of three statements ($\alpha = .86$). Based on Mynatt et al.'s (1998) study, *perceived technology affordances* measured the extent to which respondents thought online communities provide diverse ways of engaging and authoring, with six statements ($\alpha = .90$). *Perceived privacy protection* was measured with three statements ($\alpha = .93$). *Perceived ease of use* was measured with three statements ($\alpha = .92$), while *perceived usefulness* was an index composed of six statements ($\alpha = .84$). *Behavioral intention to participate* measured the likelihood of participating in an online community with one item anchored by a 5-point Likert scale ranging from "not likely at all" to "very likely."

4.3. Data analysis

A correlation analysis and a series of multiple regression and hierarchical regression analyses were used to test the hypotheses. For hierarchical regression, the analysis was conducted with the following steps. First, for the dependent variable of PEOU, we entered the external variables of this study: Internet self-efficacy, perceived quality, and perceived technology affordances. For the dependent variable of PU, the same external variables, with the addition of perceived privacy protection and PEOU, but excluding Internet self-efficacy, were entered first. Then, we entered age in order to see if age adds any explanatory power over the external variables and PEOU. In the next step, we entered the interaction term between age and PEOU (i.e., cross-products). For the dependent variable of BI, the external variables, PEOU, and PU were entered first. Then, we entered age second. Finally, we entered the interaction terms between age and PEOU and between age and PU. For the interaction terms, we transformed age by dividing it by ten so that we can have a similar scale to other variables.

5. Results

5.1. Descriptive statistics

As described above, this study collected data from 989 respondents, 452 of whom were non-users of online communities. Of these, 248 non-users completed the survey. After replacing missing values with the imputation method in PRELIS, this study employed the listwise deletion method for the final dataset for non-users.

Among non-users, the number of female participants was 111 (44.8%), while that of male participants was 137 (55.2%). The participants' average age was 47.09 (*SD* = 12.47; *Median* = 47; range = 20–83). Age exhibited a normal distribution (skewness = .207; kurtosis = −.350), as shown in Table 1. With respect to ethnicity, 222 participants (89.5%) were "White/Anglo/Caucasian/Middle-Eastern," ten (4.0%) were "Black/African American," seven (2.8%) were "Asian/Pacific Islander," six participants (2.4%) were classified as "Other" (2.4%), and three participants did not indicate their race. Descriptive statistics indicated that the median education was in the category of "4-year college graduate or above," and the median annual household income was in the category of "$50,000 to $99,999."

The correlation matrix for hypothesis testing is shown in Table 2. In general, the correlation coefficients among the variables were below the recommended threshold of .70 (Tabachnik & Fidell, 2001). However, two correlation coefficients with the interaction terms were greater than the threshold (the correlation coefficient between age and age × PEOU was .76, while the correlation coefficient between age and age × PU was .74). We solved the problem of the high correlations between the interaction terms by centering the variables (Aiken & West, 1991) for further analyses. When the variables were centered, the correlation coefficient between age and age × PEOU was −.07, while the correlation coefficient between age and age × PU was −.15. Overall, the correlation coefficients among the variables, except for the interaction terms, indicate that the variables do not exhibit severe multicollinearity problems.

5.2. Hypotheses testing

Prior to hypotheses testing, this study employed procedures for controlling and assessing the common method variance using Lindell and Whitney's (2001) tests. Following their instructions, we reverse-coded the variable of "age" to be "youth" to reverse the sign on the correlation with BI. The resulting positive correlation of .14 became the marker variable. All adjusted correlations with BI were still significant in the basic test, and their confidence intervals for alpha of .05 did not include zero, although PEOU was extremely close in the conservative test. The confidence intervals for alpha of .01 did not include zero except for PEOU. Overall, these results suggest the lack of a method variance explanation for correlations with BI.

As presented in Table 2, age was negatively associated with Internet self-efficacy ($r = -.15$, $p < .05$), perceived quality of online community sites ($r = -.14$, $p < .05$), PU ($r = -.14$, $p < .05$), and BI

Table 1
Age categories of the sample ($N = 248$).

Age categories	Frequency
18–24	7 (2.8%)
25–34	34 (13.7%)
35–44	68 (27.4%)
45–54	69 (27.8%)
55–64	49 (19.8%)
Over 65	21 (8.5%)

Author's personal copy

Table 2
Zero-order correlations, means, and standard deviations ($N = 248$).

Variable	1	2	3	4	5	6	7	8	9	10
1. Age	1									
2. Internet self-efficacy	−.15*	1								
3. Perceived quality	−.14*	.05	1							
4. Technology affordances	−.12	.15*	.57**	1						
5. Privacy	−.12	.14	.41**	.30**	1					
6. Perceived ease of use (PEOU)	−.10	.42**	.38**	.36**	.21**	1				
7. Perceived usefulness (PU)	−.14*	.18**	.52**	.64**	.39**	.31**	1			
8. Behavioral intention (BI)	−.14*	.15*	.29**	.35**	.38**	.27**	.38**	1		
9. Age × PEOU	.76**	.13*	.11	.12	.02	.55*	.08	.04	1	
10. Age × PU	.74**	−.01	.24**	.33**	.16*	.12	.54**	.12	.69**	1
M	47.03	4.05	3.19	3.68	2.61	3.68	3.47	2.87	17.23	16.18
SD	12.49	.68	.73	.69	1.07	.74	.72	1.05	5.51	5.04

* $p < .05$.
** $p < .01$ (2-tailed).

($r = -.14$, $p < .05$). Thus, H1b, H2c, H6b, and H7 were supported by the zero-order correlations. The relationships between age and other variables were also negative, but not statistically significant.

The results of hierarchical regression analyses are presented in Table 3. Internet self-efficacy ($\beta = .39$, $p < .001$), perceived quality ($\beta = .28$, $p < .001$), and perceived technology affordances ($\beta = .15$, $p < .05$) in the multiple regression were positively associated with PEOU, supporting H1a, H2a, and H3a.

As presented in the second block of hierarchical regression for the dependent variable of PU, perceived quality ($\beta = .15$, $p < .05$), perceived technology affordances ($\beta = .49$, $p < .001$), and perceived privacy protection ($\beta = .18$, $p < .01$) were positively associated with PU. Thus, H2b, H3b, and H4a were supported. With respect to the effect of PEOU, contrary to expectation, there was no significant association between PEOU and PU. Therefore, H5a was not supported. In addition, age did not add any significant effect on PU. Further, the interaction effect between age and PEOU on PU was not significant. Thus, H5d was not supported.

For the dependent variable of BI, as shown in the third block of the hierarchical regression, only perceived privacy protection ($\beta = .24$, $p < .001$) and PU ($\beta = .16$, $p < .05$) were significantly associated with BI, while PEOU was marginally significant ($\beta = .12$, $p < .10$). Thus, H6a was supported. The results also showed that there was no interaction effect between age and PEOU and

Table 3
The results of hierarchical regression for DVs.

Step	IV	DV								
		PEOU			PU			BI		
		R^2	ΔR^2	β	R^2	ΔR^2	β	R^2	ΔR^2	β
1	Internet self-efficacy			.39***						.02
	Perceived quality			.28***			.15*			−.02
	Technology affordances			.15*			.49***			.13
	Privacy						.18**			.25***
	PEOU						.04			.12+
	PU									.17*
		.32	.32		.47	.47		.23	.23	
2	Internet self-efficacy									.01
	Perceived quality						.15*			−.03
	Technology affordances						.49***			.12
	Privacy						.18**			.25***
	PEOU						.03			.13+
	PU									.17*
	Age						−.03			−.06
	Age × PEOU						−.04			
					.48	.01		.24	.01	
3	Internet self-efficacy									.01
	Perceived quality									−.02
	Technology affordance									.13
	Privacy									.24***
	PEOU									.12+
	PU									.16*
	Age									−.08
	Age × PEOU									−.03
	Age × PU									−.09
								.25	.01	

\+ $p < .10$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

Author's personal copy

between age and PU on BI. Thus, neither H5e nor H6c was supported. Table 4 summarizes the results of hypothesis testing.

6. Discussion

This study applied the TAM model in the context of online communities and attempted to extend it with the moderator of age. It examined age differences in perceptions of online communities and the relative importance of the factors affecting future intention to participate in online communities. Results provided partial support for the propositions of the TAM, age differences in external variables, and the moderating role of age.

6.1. Interpretations of findings

With respect to the first goal of this study, the validation of the TAM in the context of online communities, our findings did not support the path from PEOU to PU, contrary to the prediction from the TAM. Given that a number of studies that utilized the TAM confirmed the path from PEOU to PU, this finding is quite surprising. However, a closer look at the characteristics of online communities makes this finding understandable. Previous TAM studies have examined new technologies which require new skills or at least time for familiarization for optimal use, and thus, PEOU was considered to be an important factor for PU. In contrast, online communities are composed of many existing Internet applications and functions such as posting messages/photos or exchanging information with other users. Thus, we speculate that, for Internet users who are already familiar with a variety of the functions and features of Internet applications, PEOU is not necessarily a significant predictor for PU. In sum, this study suggests that the path from PEOU to PU can be unimportant under certain circumstances. As technologies become more user-friendly and as more technologies are built upon the skills and knowledge of existing technologies, PEOU's power of predicting PU is expected to be insignificant or minimal. Particularly, in the web environment where people often learn new applications from navigation and tinkering, the existence of a significant path from PEOU to PU cannot be taken for granted.

This study also introduced a few external variables that may affect online community participation. Internet self-efficacy had a direct effect on PEOU. Given that online communities are a kind of Internet application, it is clear that confidence in using the Internet led to PEOU of the communities. This finding is in parallel with previous studies that examined the association between computer/Internet self-efficacy and PEOU (e.g., Park, 2010; Thong, Hong, & Tam, 2002; Venkatesh, 2000).

With respect to perceived quality of online community sites, the variable was positively associated with both PEOU and PU. This finding makes sense in that improved site quality in terms of features and designs can enhance people's perception of ease of use and usefulness toward online communities. Thus, it can be said that perceived quality plays a facilitating role for non-users to perceive the sites as easy to use and useful. Similarly, perceived technology affordances also have a direct impact on both PEOU and PU. In other words, those who value the functions of online communities hold the expectation that participation in online communities would be both easy and useful. According to the findings of this study, positive assessment in both technical and functional aspects of online communities leads to favorable perceptions that the use of online communities is easy and beneficial.

Results for the variable perceived privacy protection were interesting. While perceived quality of the community sites and technology affordances lost their significance when entered into the equation for the dependent variable BI, perceived privacy protection still exhibited a significant effect on BI, as shown in Table 3. Thus, the issue of privacy in online communities may be a more important concern to non-users.

With respect to the second objective of this study, investigation of age differences in perceptions of online communities and non-users' future likelihood of participation, this study found that age was negatively associated with Internet self-efficacy, perceived quality of online community sites, PU, and BI. In particular, the negative associations between age and PU and BI indicate that there still exist significant generational gaps despite the rapid growth in Internet use among older adults. Further, the negative associations between age and Internet self-efficacy and perceived quality of online community sites suggest that older adults still experience difficulties in fully enjoying Internet applications because of their lack of confidence or the poor quality of the sites they visit. This is in line with previous findings that high levels of computer anxiety are a key factor in older adults' reluctance to use computers (e.g., Chaffin & Harlow, 2005; Czaja et al., 2006; Jung et al., 2010; Saunders, 2004).

Contrary to our hypotheses, we did not find age-related differences in perceived privacy protection and PEOU in the context of online community participation. In our study, younger and older adults were not different in their degrees of concern about privacy issues within online communities. As Raynes-Goldie (2010)

Table 4
Summary of hypothesis tests.

	Hypothesis	Support
H1a	Internet self-efficacy → Perceived ease of use	Yes
H1b	Age → Internet self-efficacy (negative relationship)	Yes
H2a	Perceived quality of online community → Perceived ease of use	Yes
H2b	Perceived quality of online community → Perceived usefulness	Yes
H2c	Age → Perceived quality of online community (negative relationship)	Yes
H3a	Perceived technology affordances → Perceived ease of use	Yes
H3b	Perceived technology affordances → Perceived usefulness	Yes
H3c	Age → Technology affordances (negative relationship)	No
H4a	Perceived privacy protection → Perceived usefulness	Yes
H4b	Age → Perceived privacy protection (negative relationship)	No
H5a	Perceived ease of use → Perceived usefulness	No
H5b	Perceived ease of use → Behavioral intention	No
H5c	Age → Perceived ease of use (negative relationship)	No
H5d	Age moderates the relationship between perceived ease of use and perceived usefulness.	No
H5e	Age moderates the relationship between perceived ease of use and behavioral intention	No
H6a	Perceived usefulness → Behavioral intention	Yes
H6b	Age → Perceived usefulness (negative relationship)	Yes
H6c	Age moderates the relationship between perceived usefulness and behavioral intention to use online communities	No
H7	Age → Behavioral intention (negative relationship)	Yes

Author's personal copy

suggests, it may not be the case that the young do not value privacy, but the concept of online privacy has evolved to reflect generational differences. This study was not able to tap into the question whether the young and the old hold different perceptions of privacy, yet it suggests a need to reconsider our conventional thinking that younger adults are careless in protecting their personal information online. Further, the finding that older and younger adults were not different in their perception of difficulty in online community participation provides another implication: There may be some other factors that make older adults reluctant to actively participate in online communities.

With respect to the last objective of our study, no moderating role of age was found for the dependent variables of PU and BI. None of the moderating hypotheses (H5d, H5e, and H6c) was supported, indicating that the strength of relationships among the three constructs of the TAM does not change with age. In deciding whether or not to start participating in online communities, older adults were not necessarily more influenced by the ease of use in online communities than younger adults. Similarly, in deciding whether or not they will participate in online communities in the future, younger adults were not more influenced by practical benefits or usefulness of online communities than older counterparts. Regardless of age, the key factors that affect their future intention are how they perceive privacy protection in online communities and how useful they consider the communities would be. These non-significant findings of the moderating effect of age provide an important insight. The speculation that "technology" is rather a domain of younger generations and that people in different age groups take different factors into account in making technology adoption decisions was not empirically supported. At least for the decision of future online community participation, younger people were not more strongly affected by features and functions of online communities. At the same time, the decision of older people was not more influenced by ease of use in online communities.

A few of studies supported the significant moderating role of age in its influence on BI to adopt a new technology (e.g., Morris & Venkatesh, 2000; Morris et al., 2005). However, unlike this study, those previous studies included social variables such as subjective norms (Mathieson, 1991). In the case of online communities, people in different generations may experience different degrees of social pressure to start participating in certain online communities. In addition, the TAM does not include external behavioral control variables such as ease of accessing the Internet or having an Internet connection at home (Mathieson, 1991). The parsimonious nature of the TAM may prevent age-related differences from being adequately captured by the key variables of the TAM.

6.2. Theoretical and practical implications

Results of this study offer some important theoretical insights and practical implications. First, as we found in this study, one of the key propositions of the TAM – the positive impact of PEOU on PU – was not found and the link between the two constructs should not be taken for granted. As Sun and Zhang (2006) found that the link from PEOU to PU was not significant in seven studies out of 50 TAM studies, this study provides another example of the non-significant impact of PEOU on PU. It can be interpreted that when people are familiar with the functions or features of a new technology or an application, PEOU does not necessarily influence PU. Considering that online communities have been widely used in recent years, and thus, the novelty of the communities may no longer be a factor even for non-users of online communities and PEOU is not an important predictor of PU. This finding is in parallel with the findings of Szajna's (1994) study, which demonstrated that as software users' experience increased, the effect of PEOU on PU decreased. This study provides evidence that, when studying adoption or use of Internet-based applications, PEOU might play a less critical role among Internet users who have experienced other applications. Thus, future studies need to include user experience as another moderator as suggested by Venkatesh et al. (2003) and Sun and Zhang (2006).

As hypothesized, this study found some negative relationships between age and external variables: The older Internet users become, the less efficacious they are about their use of applications online and the lower quality they generally perceive the typical online community websites to possess. Although some online communities have tailored features for older adults (Solomon, 2009), continued efforts for more enhanced features and functions from online community developers and website designers are needed in order to bridge the generational gap and better serve the needs of members of an aging society.

Although older adult Internet users compared to their younger counterparts had lower Internet self-efficacy and less favorable attitudes toward the quality of online communities, these age-based differences did not translate into the technology adoption decision mechanism as outlined in the TAM. The core technology adoption decision mechanism, represented by two paths from PEOU to PU and from PU to BI, did not differ by age. Generational gaps did not affect the relative importance of the factors affecting future intention to participate in online communities. This finding is contradictory to the speculation that age would help enhance the explanatory power of the TAM when included as a moderator (Agarwal & Karahanna, 2000; Lucas & Spitler, 1999; Sun & Zhang, 2006). Nevertheless, this study confirms the theoretical importance of PEOU and PU: Regardless of age, an individual's intention to adopt a certain new technology can be explained by PEOU and PU. Internet users, whether they are young or old, are attracted to online communities that are easy and useful. It was not the case that ease or usefulness is more or less important to one generation than the others.

6.3. Limitations

This study has some limitations. First, given that online communities are a newly developed social realm for communication and entertainment, it is obvious that social norms or other people's influence may play an important role in individuals' intention to participate in the communities. Moreover, considering that some TAM as shown in some TAM studies (e.g., Venkatesh & Davis, 2000) employed subjective norms as another important determinant for technology acceptance, it would be worthwhile in future studies exploring the impact of social influence in the context of online communities and investigating the role of age as a possible moderator. Second, in this study, online community participation was regarded homogeneous without classifications. For instance, online community participation can consist of several different types of participating behaviors such as posting and lurking. Such different behaviors may represent different Internet use skills, knowledge, and motivations (Preece, Nonnecke, & Andrews, 2004) and also lead to different perceptions of ease of use, usefulness, and Internet self-efficacy. Future studies are encouraged to parse out these different participating behaviors in order to specify and expand the implications of the findings. Third, it has limited external validity due to the nature of online surveys in which appropriate sampling frames are not readily available. For instance, the participants' median age of 47 in this study was higher than the median age of 36.4 of the U.S. population in 2005 (United States Fact Sheet, 2005). Fourth, this study used Internet self-efficacy for the measure of self-efficacy for online community participation. As Bandura (1997) recommends, a more tailored measure of self-efficacy specifically to the behavior in question will be a better indicator, although Internet self-efficacy is assumed to be directly

Author's personal copy

related to self-efficacy for online community participation because Internet use is a prerequisite for participation in online communities. Finally, the variable of BI was measured with a single item, which made reliability of the variable unknown. Empirical testing of the model could benefit from a more reliable multi-item measure of the BI variable.

In conclusion, this study replicated the key propositions of the TAM in the context of online communities, focusing on age differences and their impacts on participants' future intention to take part in those communities. The study contributes to the current literature on the TAM in two aspects: First, we found no significant influence of PEOU on PU, in contrast to most TAM studies; and second, age, contrary to expectation, did not play a moderating role in predicting future intention to participate in online communities. Despite the strong call for the need to incorporate age as a moderator of the TAM (Adams et al., 1992; Agarwal & Karahanna, 2000; Lucas & Spitler, 1999), age did not enhance its explanatory power, at least in this study. Future studies are warranted to further investigate the role of age in the models of technology acceptance in other contexts with different technologies.

Furthermore, this study has implications for developers of online communities. Findings of this study confirm the importance of privacy protection. Perceived privacy protection was found to be the key factor determining non-users' future intention to participate. Additionally, the study found negative relationships between age and Internet self-efficacy and perceived quality of online community sites, which might negatively affect older adults' future likelihood of online community participation. Since those negative associations could prevent older adults from fully enjoying online communities, more enhanced features and functions customized for older adults are needed. The propositions of the TAM also have meaningful implications for online community developers. Regardless of age of a target population, developers of online community sites need to design a website that is easy to navigate and develop content that appeals to the needs of the target population. A website that is easy to use is a benefit to both young and old generations. However, unlike our conventional perception, ease of use was no more important to older than younger adults.

Acknowledgement

Our research has been supported by the University of Southern California's Annenberg Program on Online Communities (APOC) Research Initiative.

Appendix A. Measures

A.1. Age

What is your age? _____ years old.

A.2. Internet self-efficacy

I feel confident ...

1. Sending e-mail messages.
2. Saving the files attached to e-mail.
3. Finding information by using a search engine.
4. Exchanging messages with other users in discussion forums.
5. Creating a web page for the World Wide Web.
6. Attaching files to e-mail.
7. Downloading files and software.
8. Posting messages in a web bulletin board.
9. Chatting on the World Wide Web.
10. Uploading files to a website or FTP site.

A.3. Perceived quality of online community sites

1. Online community sites generally function well.
2. Online community sites are well-designed.
3. The overall quality of online community sites is high.

A.4. Perceived technology affordances

1. Online communities offer multiple ways for people to participate.
2. Online communities allow people to engage in whatever ways they feel most comfortable.
3. Online communities provide a pleasant environment for social interactions.
4. Online communities allow people to construct their online profiles.
5. Online communities provide opportunities for people to generate content they want to share.
6. Online communities allow you to write your opinions about the things that others say.

A.5. Perceived privacy protection

1. I believe privacy of online community participants is protected.
2. I believe personal information stored in online community sites is safe.
3. I trust online community sites to keep participants' information secure.

A.6. Perceived ease of use (PEOU)

1. It is easy to participate in an online community.
2. Finding my way around online community sites is not difficult.
3. It is simple to navigate online community websites.

A.7. Perceived usefulness (PU)

Online communities are useful for ...

1. Information acquisition.
2. Information exchange.
3. Relationship development.
4. Relationship maintenance.
5. Social and emotional support.
6. Entertainment.

A.8. Behavioral intention (BI)

How likely are you to participate in an online community in the near future?

References

Abril, P. S. (2007). A (My)Space of one's own: On privacy and online social networks. *Northwestern Journal of Technology and Intellectual Property, 6*(1). Retrieved September 5, 2009, from http://www.law.northwestern.edu/journals/njtip/v6/n1/4/.

Adams, D. A., Nelson, R. R., & Todd, P. A. (1992). Perceived usefulness, ease of use, and usage of information. *MIS Quarterly, 16*(2), 227–250.

Agarwal, R., & Karahanna, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. *MIS Quarterly, 24*(4), 665–694.

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179–211.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Author's personal copy

Akhter, S. H. (2003). Digital divide and purchase intention: Why demographic psychology matters. *Journal of Economic Psychology, 24*(3), 321–327.

Arch, A. (2008). *Web accessibility for older users: A literature review*. W3C Working Draft. Retrieved January 20, 2010, from http://www.w3.org/TR/wai-age-literature/.

Arning, K., & Ziefle, M. (2007). Understanding age differences in PDA acceptance and performance. *Computers in Human Behavior, 23*(6), 2904–2927.

Aspan, M. (2008, February 11). How sticky is membership on Facebook? Just try breaking free. *New York Times*. Retrieved October 21, 2008, from http://www.nytimes.com/2008/02/11/technology/11facebook.html?_r=1&scp=1&sq=how%20sticky%20is%20mebership%20on%20facebook&st=cse&oref=slogin.

Bagozzi, R. P. (2007). The legacy of the technology acceptance model and a proposal for a paradigm shift. *Journal of the Association for Information Systems, 8*(4), 244–254.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Barnes, S. J., & Vidgen, R. (2003). Measuring web site quality improvements: A case study of the forum on strategic management knowledge exchange. *Industrial Management and Data Systems, 103*(5), 297–309.

Belanger, F., Fan, W., Schaupp, L. C., Krishen, A., Everhart, J., Poteet, D., et al. (2006). Web site success metrics: Addressing the duality of goals. *Communications of the ACM, 49*(12), 114–116.

Benbasat, I., & Barki, H. (2007). Quo vadis, TAM? *Journal of the Association for Information Systems, 8*(4), 211–218.

Bradner, E. (2001). Social affordances of computer-mediated communication technology: Understanding adoption. In *CHI '01 extended abstracts on human factors in computing systems* (pp. 67–68).

Chadwick-Dias, A., McNulty, M., & Tullis, T. (2003). Web usability and age: How design changes can improve performance. In *Proceedings of the 2003 ACM conference on universal usability* (pp. 30–37).

Chaffin, A. J., & Harlow, S. D. (2005). Cognitive learning applied to older adult learners and technology. *Educational Gerontology, 31*, 301–329.

Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Information Systems Research, 14*(2), 189–217.

Clifford, S. (2009, June 1). Online, 'a reason to keep on going.' *New York Times*. Retrieved September 5, 2009, from http://www.nytimes.com/2009/06/02/health/02face.html.

Cumming, E., & Henry, W. E. (1961). *Growing old, the process of disengagement*. New York: Basic Books.

Czaja, S., Charness, N., Fisk, A., Hertzog, C., Nair, S., Rogers, W., et al. (2006). Factors predicting the use of technology: Findings from the Center for Research and Education on Aging and Technology Enhancement (CREATE). *Psychology and Aging, 21*(2), 333–352.

Daugherty, T. (2007, April 19). Personal communication.

Davis, F. D. (1986). *A technology acceptance model for empirically testing new end-user information systems: Theory and results*. Unpublished doctoral dissertation, Massachusetts Institute of Technology, Cambridge, MA.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance. *MIS Quarterly, 13*(3), 319–340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982–1003.

DeLone, W., & McLean, E. (1992). Information systems success: The quest for the dependent variable. *Information Systems Research, 3*(1), 60–95.

Eastin, M. S. (2002). Diffusion of e-commerce: An analysis of the adoption of four e-commerce activities. *Telematics and Informatics, 19*(3), 251–267.

Eastin, M. S., & LaRose, R. (2000). Internet self-efficacy and the psychology of the digital divide. *Journal of Computer-Mediated Communication, 6*(1). Retrieved October 6, 2006, from http://jcmc.indiana.edu/vol6/issue1/eastin.html.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Gefen, D., & Straub, D. W. (1997). Gender differences in the perception and use of e-mail: An extension to the technology acceptance model. *MIS Quarterly, 21*(4), 389–400.

Gilly, M. C., & Zeithaml, V. A. (1985). The elderly consumer and adoption of technologies. *Journal of Consumer Research, 12*(3), 353–357.

Goodhue, D. L. (2007). Comments on Benbasat and Barki's "Quo vadis TAM" article. *Journal of the Association for Information Systems, 8*(4), 219–222.

Hall, D. T., & Mansfield, R. (1975). Relationships of age and seniority with career variables of engineers and scientists. *Journal of Applied Psychology, 60*(2), 201–210.

Harrison, A. W., & Rainer, R. K. (1992). The influence of individual differences on skill in end-user computing. *Journal of Management Information Systems, 9*(1), 93–111.

Hernández-Encuentra, E. H., Pousada, M., & Gomez-Zuniga, B. (2009). ICT and older people: Beyond usability. *Educational Gerontology, 35*(3), 226–245.

Horton, R. P., Buck, T., Waterson, P. E., & Clegg, C. W. (2001). Explaining intranet use with the technology acceptance model. *Journal of Information Technology, 16*, 237–249.

Hsu, M.-H., & Chiu, C.-M. (2004). Internet self-efficacy and electronic service acceptance. *Decision Support Systems, 38*, 369–381.

Hu, P. J., Chau, P. Y. K., Sheng, O. R. L., & Tam, K. Y. (1999). Examining the technology acceptance model using physician acceptance of telemedicine technology. *Journal of Management Information Systems, 16*, 91–112.

Huh, Y. E., & Kim, S. H. (2008). Do early adopters upgrade early? Role of post-adoption behavior in the purchase of next-generation products. *Journal of Business Research, 61*(1), 40–46.

Jaeger, P., & Xie, B. (2009). Developing online community accessibility guidelines for persons with disabilities and older adults. *Journal of Disability Policy Studies, 20*(1), 55–63.

Jayson, S. (2009, January 14). Older adults among new members on social networking sites. *USA Today*. Retrieved September 5, 2009, from http://www.usatoday.com/tech/hotsites/2009-01-14-social-networking_N.htm.

Jones, S., & Fox, S. (2009). *Generations online in 2009*. New York: Pew Internet & American Life Project.

Jung, Y., Peng, W., Moran, M., Jin, S.-A., McLaughlin, M., Cody, M., et al. (2010). Low-income minority seniors' enrollment in a Cyber Café: Psychological barriers to crossing the digital divide. *Educational Gerontology, 36*(3), 193–212.

Kim, A. (2000). *Community building on the Web*. Berkeley, CA: Peachpit Press.

King, R. R., & He, J. (2007). A meta-analysis of the technology acceptance model. *Information & Management, 43*, 740–755.

Koh, J., Kim, Y. G., Butler, B., & Bock, G. W. (2007). Encouraging participation in virtual communities. *Communications of the ACM, 50*(2), 68–73.

Kornblum, J. (2007, October 22). Online privacy? For young people, that's old-school. *USA Today*. Retrieved March 20, 2009, from http://www.usatoday.com/tech/webguide/internetlife/2007-10-22-online-privacy_N.htm.

Laguna, K., & Babcock, R. L. (1997). Computer anxiety in young and older adults: Implications for human–computer interactions in older populations. *Computers in Human Behavior, 13*(3), 317–326.

Lanseng, E. J., & Andreassen, T. W. (2007). Electronic healthcare: A study of people's readiness and attitude toward performing self-diagnosis. *International Journal of Service Industry Management, 18*(4), 394–417.

LaRose, R., & Atkin, D. (1991). Attributes of movie distribution channels and consumer choice. *Journal of Media Economics, 4*(1), 3–17.

Lee, Y.-C. (2006). An empirical investigation into factors influencing the adoption of an e-learning system. *Online Information Review, 30*(5), 517–541.

Lee, J. K., Braynov, S., & Rao, R. (2003). Effects of public emergency on citizens' usage intention toward e-government: A study in the context of war in Iraq. In *ICIS 2003 proceedings*. Retrieved September 5, 2009, from http://aisel.aisnet.org/icis2003/83.

Lee, Y., Kozar, K. A., & Larsen, K. R. T. (2003). The technology acceptance model: Past, present, and the future. *Communications of the AIS, 12*, 752–780.

Lepa, J., & Tatnall, A. (2006). Using actor-network theory to understanding virtual community networks of older people using the Internet. *Journal of Business Systems, Governance and Ethics, 1*(4). Retrieved September 6, 2009, from http://www.jbsge.vu.edu.au/issues/vol01no4/Lepa.pdf.

Liaw, S. S., & Huang, H. M. (2003). An investigation of user attitudes toward search engines as an information retrieval tool. *Computers in Human Behavior, 19*(6), 751–765.

Lin, H.-F. (2008). Antecedents of virtual community satisfaction and loyalty: An empirical test of competing theories. *CyberPsychology & Behavior, 11*(2), 138–144.

Lindell, M. K., & Whitney, D. J. (2001). Accounting for common method variance in cross-sectional research designs. *Journal of Applied Psychology, 86*, 114–121.

Lucas, H. C., & Spitler, V. K. (1999). Technology use and performance: A field study of broker workstations. *Decision Sciences, 30*(2), 291–311.

Majchrzak, A., & Cotton, J. (1988). A longitudinal study of adjustment to technological change: From mass to computer automated batch production. *Journal of Occupational Psychology, 61*, 43–66.

Mathieson, K. (1991). Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. *Information systems research, 2*(3), 173–191.

Modahl, M. (1999). *Now or never: How companies must change today to win the battle for Internet consumers*. New York: HarperCollins Publishers.

Moon, J.-W., & Kim, Y.-G. (2001). Extending the TAM for a world-wide-web context. *Information & Management, 38*(4), 217–230.

Morris, M. G., & Venkatesh, V. (2000). Age differences in technology adoption decisions: Implications for a changing work force. *Personnel Psychology, 53*(2), 375–403.

Morris, M. G., Venkatesh, V., & Ackerman, P. L. (2005). Gender and age differences in employee decisions about new technologies: An extension to the theory of planned behavior. *IEEE Transactions on Engineering Management, 52*, 69–84.

Mynatt, E. D., O'Day, V. L., Adler, A., & Ito, M. (1998). Network communities: Something old, something new, something borrowed. *Computer Supported Cooperative Work (CSCW), 7*(1), 123–156.

Nahm, E. S., Resnick, B., & Mills, M. E. (2003). A model of computer-mediated social support among older adults. In *American medical informatics association 2003 symposium proceedings* (pp. 948).

Norman, D. A. (1988). *The design of everyday things*. New York: Doubleday.

Paine, C., Reips, U.-D., Stieger, S., Joinson, A., & Buchanan, T. (2007). Internet users' perceptions of 'privacy concerns' and 'privacy actions'. *International Journal of Human–Computer Studies, 65*(6), 526–536.

Park, N. (2010). Adoption and use of computer-based voice over Internet protocol phone service: Toward an integrated model. *Journal of Communication, 60*(1), 40–72.

Park, N., Lee, K. M., & Cheong, P. H. (2007). University instructors' acceptance of electronic courseware: An application of the technology acceptance model. *Journal of Computer-Mediated Communication, 13*(1). Retrieved September 10, 2009, from http://jcmc.indiana.edu/vol13/issue1/park.html.

Author's personal copy

Park, N., Roman, R., Lee, S., & Chung, J. E. (2009). User acceptance of a digital library system in developing countries: An application of the technology acceptance model. *International Journal of Information Management, 29*(3), 196–209.

Paul, G., & Stegbauer, C. (2005). Is the digital divide between young and elderly people increasing? *First Monday, 10*. Retrieved March 10, 2009, from http://131.193.153.231/www/issues/issue10_10/paul/index.html.

Phang, C. W., Sutanto, J., Kankanhalli, A., Li, Y., Tan, B. C. Y., & Teo, H. H. (2006). Senior citizens' acceptance of information systems: A study in the context of e-government services. *IEEE Transactions on Engineering Management, 53*(4), 555–569.

Phillips, L. W., & Sternthal, B. (1977). Age differences in information processing: A perspective on the aged consumer. *Journal of Marketing Research, 14*(4), 444–457.

Porter, C. E., & Donthu, N. (2006). Using the technology acceptance model to explain how attitudes determine Internet usage: The role of perceived access barriers and demographics. *Journal of Business Research, 59*(9), 999–1007.

Preece, J., Nonnecke, B., & Andrews, D. (2004). The top five reasons for lurking: Improving community experiences for everyone. *Computers in Human Behavior, 20*(2), 201–223.

Rayburn, J. D. (1996). Uses and gratifications. In M. B. Salwen & D. W. Stacks (Eds.), *An integrated approach to communication theory and research* (pp. 145–163). Mahwah, NJ: Lawrence Erlbaum Associates.

Raynes-Goldie, K. (2010). Aliases, creeping, and wall cleaning: Understanding privacy in the age of Facebook. *First Monday, 15*(1). Retrieved Feb 10, 2010, from http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/2775/2432.

Roca, J. C., Chiu, C. M., & Martínez, F. J. (2006). Understanding e-learning continuance intention: An extension of the technology acceptance model. *International Journal of Human–Computer Studies, 64*(8), 683–696.

Ruhleder, K. (2002). Understanding on-line community: The affordances of virtual space. *Information Research, 7*(3). Retrieved November 10, 2008, from http://informationr.net/ir/7-3/paper132.html.

Saunders, E. J. (2004). Maximizing computer use among the elderly in rural senior centers. *Educational Gerontology, 30*, 573–585.

Sheehan, K. (2001). E-mail survey response rates: A review. *Journal of Computer-Mediated Communication, 6*(2). Retrieved November 6, 2008, from http://jcmc.indiana.edu/vol6/issue2/sheehan.html.

Smith, C. B. (1997). Casting the Net: Surveying an Internet population. *Journal of Computer-Mediated Communication, 3*(1). Retrieved November 6, 2008, from http://jcmc.indiana.edu/vol3/issue1/smith.html.

Solomon, L. K. (2009, March 21). New social networking web site geared to seniors. *South Florida Sun-Sentinel*. Retrieved March 24, 2009, from http://www.sun-sentinel.com/news/local/palmbeach/sfl-flpkvetch0321sbmar21,0,2448125.story.

Straub, D. W., & Burton-Jones, A. (2007). Veni, vidi, vici: Breaking the TAM logjam. *Journal of the Association for Information Systems, 8*(4), 223–229.

Sun, H., & Zhang, P. (2006). The role of moderating factors in user technology acceptance. *International Journal of Human–Computer Studies, 64*(2), 53–78.

Szajna, B. (1994). Software evaluation and choice: Predictive validation of the technology acceptance instrument. *MIS Quarterly, 18*(3), 319–324.

Tabachnik, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). Boston: Allyn & Bacon.

Thompson, L. F., Surface, E. A., Martin, D. L., & Sanders, M. G. (2003). From paper to pixels: Moving personnel surveys to the Web. *Personnel Psychology, 56*(1), 197–227.

Thong, J. Y. L., Hong, W., & Tam, K.-Y. (2002). Understanding user acceptance of digital libraries: What are the roles of interface characteristics, organizational context, and individual differences? *International Journal of Human–Computer Studies, 57*, 215–242.

Turner, P., Turner, S., & Van de Walle, G. (2007). How older people account for their experiences with interactive technology. *Behaviour & Information Technology, 26*(4), 287–296.

United States Fact Sheet (2005). 2005 American community survey data profile highlights. Retrieved October 16, 2008, from http://factfinder.census.gov/servlet/ACSSAFFFacts?_submenuId=factsheet_1&_sse=on.

Van de Watering, M. (2007). The impact of computer technology on the elderly. Retrieved March 10, 2009, from http://www.few.vu.nl/~rvdwate/HCI_Essay_Marek_van_de_Watering.pdf.

Venkatesh, V. (1999). Creation of favourable user perceptions: Exploring the role of intrinsic motivation. *MIS Quarterly, 23*(2), 239–260.

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating perceived behavioral control, computer anxiety and enjoyment into the technology acceptance model. *Information Systems Research, 11*(4), 342–365.

Venkatesh, V., & Davis, F. D. (1996). A model of the antecedents of perceived ease of use: Development and test. *Decision Sciences, 27*, 451–481.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186–204.

Venkatesh, V., Davis, F. D., & Morris, M. G. (2007). Dead or alive? The development, trajectory and future of technology adoption research. *Journal of the Association for Information Systems, 8*(4), 267–286.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478.

Walker, G., & Johnson, N. (2008). Faculty intentions to use components for web-enhanced instruction. *International Journal on E-Learning, 7*(1), 133–152.

Wangpipatwong, S., Chutimaskul, W., & Papasratorn, B. (2008). Understanding citizen's continuance intention to use e-government website: A composite view of technology acceptance model and computer self-efficacy. *Electronic Journal of e-Government, 6*(1), 55–64.

White, T. (2008, April 27). Boomers go online to stay connected. *The Baltimore Sun*. Retrieved May 1, 2008, from http://www.baltimoresun.com/entertainment/bal-al.eons27apr27,0,3674731.story.

Yousafzai, S. Y., Foxall, G. R., & Pallister, J. G. (2007a). Technology acceptance: A meta-analysis of the TAM: Part 1. *Journal of Modeling in Management, 2*(3), 251–280.

Yousafzai, S. Y., Foxall, G. R., & Pallister, J. G. (2007b). Technology acceptance: A meta-analysis of the TAM: Part 2. *Journal of Modeling in Management, 2*(3), 281–304.

Zaphiris, P., & Rifaht, S. (2006). Trends, similarities, and differences in the usage of teen and senior public online newsgroups. *ACM Transactions on Computer–Human Interaction, 13*(3), 403–422.