
Is it Institutional or System Trust: Mediating the Effect of Generational Cohort Membership on Online Banking Intentions

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Abstract

A cross sectional survey of Amazon Mechanical Turk (MTurk) users ($N = 559$) was conducted to investigate the mediation effect of institutional and system trust on generational differences in online banking intentions. Results of serial mediation models showed that the effect of age on online banking intentions was best mediated through the serial combination of institutional and system trust, respectively. Theoretical and practical implications are discussed.

Keywords: Online banking; generational differences; institutional trust; system trust

Citation: Alhabash, S., Brooks, B.A., Jiang, M., Rifon, N.J., LaRose, R., Cotton, S. (2015). Is it Institutional or System Trust: Mediating the Effect of Generational Cohort Membership on Online Banking Intentions. In *iConference 2015 Proceedings*.

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Acknowledgements: This research was supported through a National Science Foundation Grant#1318885.

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1 The Online Banking Phenomena

Older adults, though lagging in technology use, are increasingly adopting information communication technologies (ICTs; Smith, 2014). Smith (2014) argued that while physical, attitudinal, and learning barriers may explain older adults lag in technology adoption, older adults incorporate the Internet in their daily lives once they begin using it. With a lack in longitudinal data tracking online behaviors by older adults past initial adoption, it becomes important to look at the factors that can both motivate and maintain use of new technologies.

Financial institutions are working hard to move customers from brick-and-mortar banks to virtual banks, which lower fixed costs by hiring fewer staff and acquiring fewer offices and branches. One expects that lower fees and the convenience of instant access to one's bank account contribute to increasing adoption of online banking, but seniors still lag behind despite their use of the Internet. Understanding this phenomenon is of vital importance for its financial, economic, social, and psychological effects on consumers, financial institutions, and policymakers.

Online banking security is a considerable piece of the puzzle, but not the only. Recent incidents of security breaches to financial information show that the vulnerability of online financial information and transactions is a consumer concern, but is often hard to understand and act upon at the system, institution, and individual level. The complex interaction between financial institutions, system designers, and legislatures impacts understanding of individual use of online banking. Thus, it is important to consider how individuals perceive both institutional trust, such as a bank, and system level trust, such as the Internet. It is estimated that 61% of U.S. online adults use online banking (Fox, 2013). Earlier this year, Nielsen (2014) showed this number had risen to 82% in 2014. While younger adults take the lead in online banking adoption, half of older adults (aged 50 to 65+) report banking online (Fox, 2013). Income factors, technological barriers, security concerns, start-up costs, and lack of personal service are affecting online banking adoption (Bomberger, 2010; Mattila, Karjaluoto, & Pento, 2003; O'Connell, 2012); all of which are sensitive to generational differences.

The current study focuses on how generational differences in online banking can be attributed to e-trust. More specifically, we are interested in understanding how institutional and system trust mediates the effect of age (generational cohort membership) on the expression of online banking intentions (OBI). The importance of testing such mediation models is of importance to both banking/financial institutions as well as system designers in that we explore the causal order of these different facets of trust as they pertain to online banking intentions.

1.1 Studies of Online Banking Adoption

Growth in online banking adoption has been reflected in increasing scholarly attention to understand what motivates people to use online banking. The Technology Acceptance Model (TAM; Davis, 1989) has been widely used in the online banking adoption research. Perceived ease of use and perceived usefulness are the two major positive predictors of online banking adoption (Kim, Shjom, & Lee, 2009). Extending the TAM, other predictors have been found to influence adoption of online banking: information provided on online banking websites (Pikkarainen, Pikkarainen, Karjaluoto, & Pahnla, 2004), perceived time, financial, security, and privacy risks (Pavlou, 2003; Lee, 2009; Chong, Ooi, Lin, & Tan, 2010), trust and satisfaction (Pavlou, 2003; Rexha, Russel Phillip, & Audrey Shang, 2003; Flavian, Guinaliu, & Torres, 2006), perceived credibility (Wang, Wang, Lin, & Tang, 2003), government support (Chong et al., 2010), and socio-demographic factors (Flavian et al., 2006).

Generally, trust in the online banking institution, as well as trust in the system (in relation to system security), is pivotal in driving an individual to the digital world of banking. Rexha, Russel Phillip, & Audrey Shang (2003) found that trust positively predicted e-banking adoption and commitment to using online banking. They also found that trust mediated the effect of customer satisfaction on commitment to online banking. Flavian, Guinaliu, & Torres (2006) found that consumer trust in a physical bank can be transferred into online and thus influence their adoption of online banking services. However, considering the physical, technological, and attitudinal barriers that affects online banking adoption across different age groups this study focuses on explaining these relationships as a function of generational differences rather than only trust in the institution or system.

1.2 Internet Use and Online Banking across the Lifespan

Recent studies have begun to differentiate users of information and communication technologies (ICTs) according to their generational age cohorts (Lenhart, 2009; Smith, 2010; Warr, Cotten, & Anderson, 2011; Zickuhr, 2010) noting that particular patterns of ICT use reflect users' life stages and socialization experiences (Cotten, McCullough & Adams, 2011). In the current study, we focus on three generational cohorts defined by Zickhur (2010): Millennials (born 1977-1992), Older Boomers (born 1946-1954), and SGI, combining the Silent Generation (born 1937-1945) and GI Generation (born 1936 or before).

Millennials are "digital natives" born during a time when ICTs were already pervasive. As Palfrey and Gasser (2008, p.4) note: "They (Millennials) are joined by a set of common practices, including the amount of time they spend using digital technologies, their tendency to multitask, their tendency to express themselves and relate to one another in ways mediated by digital technologies, and their pattern of using the technologies to access and use information ...". ICTs are a given part of Millennials' social environment and have never known a life without ICTs (Cotten, et al., 2011). Unlike older cohorts, Millennials have not had to relearn how to do things with technology. Compared to their older counterparts, Millennials use many ICTs, stay constantly connected via ICTs, and use ICTs to form, maintain, and end relationships with social ties (Ito, Horst, Bittanti, Boyd, Herr-Stephenson, Lange, Pascoe, & Robinson, 2008; Ling, 2008; Palfrey & Gasser, 2008).

Older Boomer cohorts are referred to as 'digital immigrants' (Palfrey & Gasser, 2008). Digital immigrants include a wide age range – from early middle age to early stages of old age. Because of this age range, these different groups are likely to have had differing experiences with ICTs across their life course (Cotten et al., 2011). Individuals in these cohorts have had to learn how to use ICTs, as many ICTs were developed and proliferated after they were adults. Unlike members of younger cohorts, Older Boomers have had to relearn how to do things via ICTs. For those cohorts closer to Millennials, this has most likely been easier due to the transmission of knowledge and interaction with ICTs. However, for those falling into the Older Boomers, it has most likely been harder for them to learn how to use and integrate ICTs into their lives, as they haven't had the need to integrate them into their lives. Nonetheless, many members of these cohorts had initial contact with ICTs in school and work settings in which both technical and social support were available, not only for the acquisition of basic computer skills, but also for coping skills related to security threats (Grimes, Hough, & Signorella, 2007).

Individuals in the SGI cohort are even further distanced from the necessity to use ICTs than Older Boomers. SGIs face greater hardship learning to use and integrate these new technologies into their lives. Those SGIs who are still in the workforce have a higher likelihood of ICT use (Peacock, 2009). Although there is some evidence of older adults adopting ICTs more and more, increasingly barriers to ICT use are becoming apparent. SGIs are concerned about privacy and security, physical and cognitive factors, declining vision and mobility, lack of access and/or ability to afford the ICTs, and attitudes that the technology has passed them by and there is no need to integrate ICTs into their lives (Cotten, 2010; Czaja & Barr, 1989; Czaja, Charness, Fisk, Hertzog, Nair, Rogers, & Sharit, 2006; Freese, Rivas, &

Hargittai, 2006; Loges & Jung, 2001). All generational cohorts need additional training, but SGIs represent a unique cohort and if they are to become proficient in using ICTs (Cotten, 2011; Berkowsky, Cotten, Yost, & Winstead, 2013) their behaviors and attitudes need to be understood, particularly in risky situations.

Despite the fact that online banking has gained popularity across all generational groups, the adoption rate seems slower for older individuals (Fox, 2013; Mattila et al., 2003). Older adults, compared to their younger counterparts, are less likely to adopt online banking and mobile banking due to perceived risks and lower self-efficacy (Laukkanen, Sinkkonen, Marke, & Laukkanen, 2007; Mattila et al., 2003; Wilkowska & Ziefle, 2009). The widespread and diversification of mobile devices may lead to greater technology adoption by those older adults, thus greater diversification of online/mobile activities. With this in mind, how can we build services and systems that motivate older adults to shift to online banking? How can institutional and system trust affect online banking adoption and use intentions. The following section focuses on the concept of e-Trust and explicates facets of trust in relation to institutions and systems.

1.3 e-Trust and Online Banking

E-trust is a widely studied phenomenon in the e-commerce literature (Gefen, Karahanna, & Straub, 2003) but is in reference to general perceptions of the online environment rather than separating being online versus specific uses. When asked about who is responsible for online security, Internet service providers and software companies are most often named, with only 10% singling out companies they do business with online (National Cyber Security Alliance, 2012a). Yet, financial firms are the industry that online consumers trust the most with information security (O'Connell, 2012). The paradox then is how individuals trust an entire system, the Internet and actors primarily attached to the service of the Internet versus a company that attempts to generate business through services offered online. This presents a target of opportunity for online banking providers who might wish to improve consumers' security skills with financial benefit to both parties as an outcome. However, the order at which individual users are trained in system and institution trust will not follow expected directions of causality as we demonstrate in this study.

Trust is defined as a willingness to rely on an exchange partner in whom one has confidence (Moorman, Deshpande & Zaltman, 1993). Trust is an important factor when determining consumer use of technology, but also use of technological systems. In order for older adults to use an e-commerce website, they must trust the system as a whole. In this study, the assumption is that trust must be placed in the Internet as a system. If an individual has no trust in their security being on a device connected to the Internet than it is unlikely the individual will utilize e-commerce. System trust is defined as a "belief that the proper impersonal structures have been put into place enabling one party to anticipate successful transactions with another party" (Pennington, Wilcox & Grover, 2003, pp. 201), institutional trust refers to the belief that an organization with which you deal is trustworthy, credible, and has a good reputation (Metlay, 1999). In other words, system trust is the belief that when using the Internet the individual consumer is generally protected during transactions with other actor's within the system, while institutional trust is the level of confidence one feels toward the organization hosting the online service (in this case, the financial institution).

In this paper, we argue that while the trust an individual has in the Internet may decide whether the consumer uses the web service, it is trust in the institution deciding whether or not the consumer attempts to utilize the banking service entirely. Other than institutional use and name recognition, banks may rely on other methods to assist consumers in trusting the service, such as third party seals (Kim, Steinfeld, & Lai, 2008; LaRose & Rifon, 2006), security warnings (LaRose & Rifon, 2007), and training in safety behaviors (Wirth, Rifon & LaRose, 2008). These methods are generally seen as a type of general Internet security and not necessarily assumed to be linked with the institution. Third party seals are important to the trust an institution receives, but only if the users are educated about what the seals mean (Kim et al., 2008). However, when security measures are used to boost institutional trust, consumers may be misled by placing too much trust in third party seals (LaRose & Rifon, 2006). Coping self-efficacy seems to be the primary moderator between institutional trust factors and use of the service (Rifon, LaRose & Choi, 2005; Wirth et al., 2008). Institutions may rely on security measures for helping consumers trust the website, but it is the actual consumer's efficacy that enables them to utilize the service.

The way system level and institutional level trust interact in the use of online banking or other forms of e-commerce have not been explored to our knowledge. However, the interaction of trust both at a system level and institutional level is very important to the presentation (seals), partnership, and interactions that occur between consumers and businesses. An individual's trust in the Internet or some

other novel technology may inhibit the use of that service, intention to use the service, and viewing others' use of that service as a positive or negative experience. Further, traditional trust of brick and mortar institutions may not carry over to the online experience. For instance, many banks are experiencing growth in online banking service use among all demographics, but see very slow growth in traditionally less technologically inclined clients such as older adults and minorities. We agree with prior literature that seals, guarantees, and ratings are important for consumer use of a web service, but these are not the only crucial factors (McKnight et al., 1998). Thus, exploring how an individual places trust in a large system like the Internet and their trust in an institution may have a mediating effect in the actual use of a service that is provided offline, but so much easier to access in the online environment. This exploration is also situated in understanding generational differences in online banking adoption and intentions.

2 Proposed Model

Past research (e.g., Fox, 2013; Smith, 2014) showed that older adults adopt new technologies and the Internet at lower rates compared to younger adults. Within the context of online banking, based on such industry insights, we hypothesize:

H1: Participants will differ significantly in their online banking intentions as a function of generational cohort membership, such that Millennials would express the greatest intentions, followed by older Boomers, and SGI generation, respectively.

While we expect that this trend will be mirrored in relation to institutional and system trust, little research in this area hinders our confidence in proposing a research hypothesis, thus we revert to asking the following research question:

RQ1: How do participants differ in their institutional and system trust ratings as a function of generational cohort membership?

The current study is set to test two competing models for the mediating effect of institutional and system trust on the effect of age on online banking intentions. Model A (shown in Figure 1, Left) places institutional trust before system trust, whereas Model B (shown in Figure 1, Right) proposes that system trust precedes institutional trust in mediating the effect of age on online banking intentions. Based on this, we asked:

RQ2: How would institutional and system trust serially mediate the effect of age on online banking intentions?

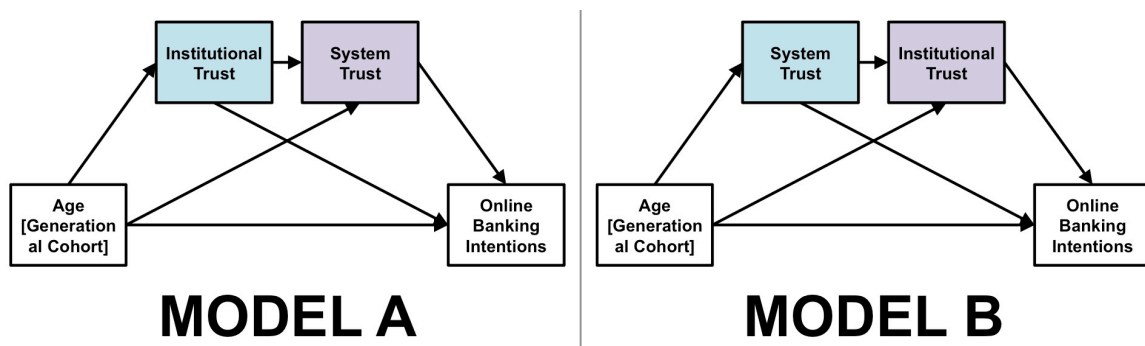


Figure 1. Serial Mediation Models.

3 Method

Identical surveys were distributed to members of three generational cohorts via Amazon's Mechanical Turk website (MTurk; <http://www.mturk.com>). MTurk is a large cloud-sourcing platform used to recruit participants for various tasks. MTurk participants were found to be more representative of the U.S. population (Berinsky, Huber, & Lenz, 2011) and more diverse than college student or other convenience samples (Buhrmester, Kwang, & Gosling, 2011).

Three Human Intelligence Tasks were posted in MTurk during December 2013 and January 2014. We aimed for 200 responses from SGI (born before 1946), Older Boomer (born 1946-1954), and Millennial (born 1977-1992) groups. We received 656 responses. We excluded 26 people who participated in a previous survey on the same topic in October 2013, 40 for failing the quality control check, and 31 for not meeting the age requirements, leaving 559 responses for data analysis. A post-participation incentive of 76 cents was given to participants.

Among the 559 participants, 156 of them were SGI, 190 Older Baby Boomers (boomers), and 213 Millennials. 49.7% were female. Age ranged from 22 to 85 years old. Most participants were Caucasian (82.6%) with the rest of the sample being 7.7% Asian, 7% African American, and 6.3% Hispanic or Latino. The average amount of education completed was 15 years. The median household income was between \$25,000 and \$49,999. About half of the sample were married or living with a partner (49.2%) and 31.7 % were single (See Table 1).

3.1 Operational Measures

Age was measured by asking participants to indicate their birth year. A ratio-level variable was then created by subtracting the reported birth year from 2014, and was used in some analyses. In other analyses, we used the generational cohort membership as an independent variable.

To measure institutional trust, participants responded to four statements rated on a 5-point Likert-type scale (anchored by “Strongly Disagree” and “Strongly Agree”). Three of the statements were adapted from Pavlou’s (2003) measure of web retailer trust: “My online bank is trustworthy,” “My online bank keeps its promises and commitments,” and “I trust my online bank because they keep my best interests in mind.” We added a fourth item was added: “My online banking transactions are secure”. Items were averaged into a single variable upon satisfactory factor and reliability analyses (*Eigenvalue* = 2.67, % of *Variance Explained* = 66.66%, *Cronbach’s α* = .888).

To measure system trust, we developed three items: “The online banking website has enough safeguards to make me feel comfortable using it for my personal business,” “I feel assured that the legal and technological structures of the online banking website adequately protect me from Internet problems,” and “In general, my online banking website is a robust and safe environment in which to transact business.” Items were averaged into a single variable upon satisfactory factor and reliability analyses (*Eigenvalue* = 2.22, % of *Variance Explained* = 73.88%, *Cronbach’s α* = .894).

We used four items from Venkatesh et al. (2012) to measure online banking intentions (OBI). Items were rated on a 5-point Likert-type scale (anchored by “Strongly Disagree” and “Strongly Agree”). The items were: “pay bills in the next month,” “apply for a loan in the next 6 months,” “check an account balance in the next week,” and “do a money transfer in the next 3 months.” Upon satisfactory factor and reliability analyses (*Eigenvalue* = 1.99, % of *Variance Explained* = 49.75%, *Cronbach’s α* = .761), the four items were averaged into a single variable.

4 Results

4.1 Generational Differences in Online Banking Intentions and Trust

H1 predicted that participants would differ in their online banking intentions as a function of their generational cohort membership. To test H1, data for online banking intentions (OBI) were submitted to a univariate ANOVA with generational cohort as an independent variable. Generational groups differed significantly in OBI, $F(2, 556) = 11.66, p < .001, \eta^2_p = .04, Power = .99$. Millennials expressed the greatest OBI ($M = 3.46, SD = .85$), followed by older boomers ($M = 3.20, SD = 1.04$), and silent generation members ($M = 2.97, SD = 1.01$), respectively. Post-hoc pairwise comparisons showed that Millennials differed significantly from boomers ($p = .03$) and SGI ($p < .001$), while the difference in OBI between boomers and SGI members approached significance ($p = .075$).

RQ1 asked about how participants differ in their institutional and system trust as a function of generational cohort membership. Data for institutional and system trust were submitted to a 3 (generational cohort membership) x 2 (trust type) ANOVA with repeated measures on the last factor. The difference in institutional ($M = 3.63, SD = .80$) and system trust ($M = 3.67, SD = .85$) approached significance, $F(1, 555) = 3.70, p = .055, \eta^2_p = .01, Power = .48$. The main effect of generational cohort on trust was significant, $F(2, 555) = 10.98, p < .001, \eta^2_p = .04, Power = .99$. Millennials appeared most trusting ($M = 3.79, SE = .05$), followed by boomers ($M = 3.68, SE = .06$), and SGI ($M = 3.41, SE = .06$), respectively. Pairwise comparisons showed that Millennials and Boomers did not differ significantly ($p = .45$), while both Millennials ($p < .001$) and boomers ($p = .005$) differed significantly from SGI members. The interaction between generational cohort membership and trust type was significant, $F(2, 555) = 4.65, p = .01, \eta^2_p = .02, Power = .78$. Millennials expressed greater system trust ($M = 3.74, SD = .69$) than institutional trust ($M = 3.74, SD = .66; p = .001$). However, Boomers (System Trust: $M = 3.70, SD = .94$; Institutional Trust: $M = 3.66, SD = .87$) and SGI members (System Trust: $M = 3.39, SD = .88$; Institutional Trust: $M = 3.43, SD = .85$) did not differ significantly in their ratings of the two types of trust.

4.2 Serial Mediation of Institutional and System Trust

RQ2 asked about how institutional trust and system trust serially mediate the effect of age on OBI. To answer this research question two serial mediation models were run using Hayes' (2013) PROCESS macros. In the first model (Model A), institutional trust preceded system trust in the serial mediation model, whereas in the second model (Model B), the order was reversed with system trust preceding institutional trust in the mediation model. In these models, age was entered as a continuous variable. Considering that the previous section reported ANOVA results of generational differences in online banking intentions and the two types of trust, we will limit the results onwards to the mediation effects.

4.2.1 Model A: Institutional Trust Preceding System Trust

As shown in Table 1, a bias-corrected bootstrap confidence interval (with 10,000 bootstrap samples) for the indirect effect of institutional trust on its own on the relationship between age and OBI included a true zero, and thus institutional trust on its own cannot be regarded as a mediator of the effect of age on OBI ($Effect = -.0009$, $SE = .0006$, $Bootstrap\ CI_{LL-UL} = -.003$ to $<.001$). However, the bias-corrected confidence interval for the indirect effect of system trust on its own was entirely below zero confirming successful mediation ($Effect = -.002$, $SE = .0006$, $Bootstrap\ CI_{LL-UL} = -.003$ to $-.0007$), indicating that older adults expressed lower system trust, which in turn resulted in lower expression of OBI. Additionally, the effect of age on OBI was mediated by the serial combination of institutional trust and system trust, respectively, considering that the bias-correct confidence interval was entirely below zero ($Effect = -.003$, $SE = .001$, $Bootstrap\ CI_{LL-UL} = -.005$ to $-.001$). The older individuals were, the lower their institutional trust, the lower their system trust, and thus the less likely are they to express OBI.

Direct Effects			
	Institutional Trust	System Trust	OBI
	β (SE)	β (SE)	β (SE)
Constant	3.94 (.10) ***	.53 (.10) ***	.83 (.19) ***
Age	-.006 (.002) ***	-.003 (.001) ***	-.004 (.002) *
Institutional Trust	--	.91 (.02) ***	.16 (.08) †
System Trust	--	--	.56 (.08) ***
Model Statistics	$R^2 = .02$, $F(1, 556) = 12.20$, $p < .001$	$R^2 = .76$, $F(2, 555) = 861.91$, $p < .001$	$R^2 = .39$, $F(3, 554) = 119.31$, $p < .001$
Indirect Effects of Age on OBI via...		Effect (SE)	Boot CI_{LL-UL}
Total Indirect Effect		-.006 (.001)	-.008 to -.003
Institutional Trust <i>only</i>		-.0009 (.0006)	-.003 to <.001
Institutional Trust → System Trust		-.003 (.001)	-.005 to -.001
System Trust <i>only</i>		-.002 (.0006)	-.003 to -.0007

Notes. † $p \leq .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 1. Serial mediation analysis for the effect of age on online banking intentions mediated by institutional and system trust, respectively.

4.2.2 Model B: System Trust Preceding Institutional Trust

As shown in Table 2, in Model B, the order of institutional and system trust was reversed in the serial mediation model, where system trust was proposed to precede institutional trust in mediating the effect of age on OBI. A bias-corrected bootstrap confidence interval (based on 10,000 bootstrap samples) was only entirely below zero in this case for the mediating effect of system trust on its own ($Effect = -.005$, $SE = .001$, $Bootstrap\ CI_{LL-UL} = -.008$ to $-.003$), while the other proposed mediation paths (through institutional trust only and through the serial combination of system and institutional trust, respectively) included a true zero.

Direct Effects			
	System Trust	Institutional Trust	OBI
	β (SE)	β (SE)	β (SE)
Constant	4.12 (.10) ***	.57 (.10) ***	.83 (.19) ***
Age	-.009 (.002) ***	-.001 (.0009) ***	-.004 (.002) *
System Trust	--	.82 (.02) ***	.56 (.08) ***
Institutional Trust	--	--	.16 (.08) †
Model Statistics	$R^2 = .04$,	$R^2 = .75$,	$R^2 = .39$,

	$F(1, 556) = 22.09,$ $p < .001$	$F(2, 555) = 842.44,$ $p < .001$	$F(3, 554) = 119.31,$ $p < .001$
Indirect Effects of Age on OBI via...	Effect (SE)	Boot CI_{LL-UL}	
Total Indirect Effect	-.006 (.001)	-.008 to -.003	
System Trust <i>only</i>	-.005 (.001)	-.008 to -.003	
System Trust → Institutional Trust	-.001 (.0007)	-.003 to .0001	
Institutional Trust <i>only</i>	-.002 (.0002)	-.0001 to .0008	

Notes. † $p \leq .10$, * $p < .05$, ** $p < .01$, $p < .001$

Table 2. Serial mediation analysis for the effect of age on online banking intentions mediated by system and institutional trust, respectively.

4.2.3 Serial Mediation for Each Generational Cohort

With this in mind, we reran the two serial mediation models to compare each generational cohort to the other two to see which causal order makes more sense for each generational cohort. First, Millennials are recoded to “1” and the two other groups as “0”, then Boomers are recoded to “1” and the others as “0”, and finally, SGI members are recoded to “1” and the others as “0”. For each of these groups, two similar models are run with cohort membership as IV, online banking intentions as DV, and the two trust variables as mediators. Table 3 shows the results for the serial mediation models with each age cohort as a reference group, where age cohort membership affects OBI via institutional and system trust, respectively. Table 4, shows a serial mediation analysis for each age cohort with system and institutional trust, respectively, as serial mediators.

In general, we see the same trend in confirming that the model that makes greater statistical sense is the one where institutional trust precedes system trust in the serial mediation model (Model A, Table 3) than the one where system trust precedes institutional trust (Model B, Table 4). The results also show that these effects are only supported when comparing Millennials to the rest of the sample, and SGI members to the rest of the sample (none of the effects were significant for the models with Older Boomers compared to the rest of the sample). This suggests that institutional trust and system trust are key factors in driving the distinctive effects of generational cohort membership on OBI exclusively for Millennials and SGI members. Boomers were not different from the other groups in these relationships, which suggests that the effects of institutional and system trust are weak and undetectable in comparison to the two other generational cohorts.

MILLENNIALS	Institutional Trust β (SE)	System Trust β (SE)	OBI β (SE)
Constant	3.56 (.04) ***	.31 (.08) ***	.53 (.16) ***
Millennials	.19 (.07) **	.12 (.04) ***	.16 (.07) *
Institutional Trust	--	.91 (.04) ***	.16 (.08) *
System Trust	--	--	.56 (.08) ***
Model Statistics	$R^2 = .01,$ $F(1, 556) = 7.10,$ $p < .001$	$R^2 = .76,$ $F(2, 555) = 860.08,$ $p < .001$	$R^2 = .39,$ $F(3, 554) = 119.15,$ $p < .001$
Indirect Effects of Age on OBI via...	Effect (SE)	Boot CI_{LL-UL}	
Total Indirect Effect	.19 (.05)	.10 to .29	
Institutional Trust <i>only</i>	.03 (.02)	.0006 to .08	
Institutional Trust → System Trust	.10 (.04)	.03 to .18	
System Trust <i>only</i>	.07 (.02)	.03 to .12	
OLDER BOOMERS	Institutional Trust β (SE)	System Trust β (SE)	OBI β (SE)
Constant	3.61 (.04) ***	.33 (.08) ***	.57 (.15) ***
Boomers	.06 (.07)	-.009 (.04)	-.07 (.07)
Institutional Trust	--	.92 (.02) ***	.15 (.08) †
System Trust	--	--	.59 (.08) ***
Model Statistics	$R^2 = .001,$ $F(1, 556) = .62,$ <i>ns</i>	$R^2 = .75,$ $F(2, 555) = 840.10,$ $p < .001$	$R^2 = .39,$ $F(3, 554) = 116.58,$ $p < .001$
Indirect Effects of Age on OBI via...	Effect (SE)	Boot CI_{LL-UL}	
Total Indirect Effect	.03 (.06)	-.08 to .15	
Institutional Trust <i>only</i>	.008 (.01)	-.009 to .05	

Institutional Trust → System Trust		.03 (.04)	-.05 to .11
System Trust <i>only</i>		-.005 (.02)	-.05 to .04
SGI	Institutional Trust	System Trust	OBI
	β (SE)	β (SE)	β (SE)
Constant	3.71 (.04) ***	.40 (.09) ***	.62 (.16) ***
SGI	-.28 (.07) ***	-.13 (.04) **	-.11 (.07)
Institutional Trust	--	.91 (.02) ***	.15 (.08) †
System Trust	--	--	.57 (.08) ***
Model Statistics	$R^2 = .02,$ $F(1, 556) = 13.91,$ $p < .001$	$R^2 = .76,$ $F(2, 555) = 860.22,$ $p < .001$	$R^2 = .39,$ $F(3, 554) = 117.31,$ $p < .001$
Indirect Effects of Age on OBI via...		Effect (SE)	Boot CI_{LL-UL}
Total Indirect Effect		-.26 (.06)	-.38 to -.15
Institutional Trust <i>only</i>		-.04 (.03)	-.11 to .001
Institutional Trust → System Trust		-.14 (.04)	-.25 to -.06
System Trust <i>only</i>		-.07 (.02)	-.12 to -.03

Notes. † $p \leq .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 3. Serial mediation analysis for the effect of generational cohort membership on online banking intentions mediated by institutional and system trust, respectively.

MILLENNIALS	System Trust	Institutional Trust	OBI
	β (SE)	β (SE)	β (SE)
Constant	3.56 (.04) ***	.64 (.07) ***	.53 (.15) ***
Millennials	.29 (.07) **	-.05 (.04)	.16 (.07) *
System Trust	--	.82 (.02) ***	.56 (.08) ***
Institutional Trust	--	--	.16 (.08) *
Model Statistics	$R^2 = .03,$ $F(1, 556) = 15.21,$ $p < .001$	$R^2 = .75,$ $F(2, 555) = 843.93,$ $p < .001$	$R^2 = .39,$ $F(3, 554) = 119.15,$ $p < .001$
Indirect Effects of Age on OBI via...		Effect (SE)	Boot CI_{LL-UL}
Total Indirect Effect		.19 (.05)	.10 to .29
System Trust <i>only</i>		.16 (.05)	.08 to .26
System Trust → Institutional Trust		.04 (.02)	-.002 to .09
Institutional Trust <i>only</i>		-.008 (.008)	-.03 to .002
OLDER BOOMERS	System Trust	Institutional Trust	OBI
	β (SE)	β (SE)	β (SE)
Constant	3.65 (.04) ***	.63 (.08) ***	.57 (.15) ***
Boomers	.04 (.08)	.02 (.04)	-.07 (.07)
System Trust	--	.82 (.02) ***	.59 (.08) ***
Institutional Trust	--	--	.15 (.08) †
Model Statistics	$R^2 = .001,$ $F(1, 556) = .31,$ <i>ns</i>	$R^2 = .75,$ $F(2, 555) = 840.71,$ $p < .001$	$R^2 = .39,$ $F(3, 554) = 116.58,$ $p < .001$
Indirect Effects of Age on OBI via...		Effect (SE)	Boot CI_{LL-UL}
Total Indirect Effect		.03 (.06)	-.08 to .14
System Trust <i>only</i>		.03 (.05)	-.07 to .12
System Trust → Institutional Trust		.005 (.01)	-.01 to .04
Institutional Trust <i>only</i>		-.003 (.006)	-.005 to .02
SGI	System Trust	Institutional Trust	OBI
	β (SE)	β (SE)	β (SE)
Constant	3.78 (.04) ***	.61 (.08) ***	.62 (.16) ***
SGI	-.38 (.08) ***	.03 (.04)	-.11 (.07)
System Trust	--	.82 (.02) ***	.57 (.08) ***
Institutional Trust	--	--	.15 (.08) †
Model Statistics	$R^2 = .04,$ $F(1, 556) = 23.43,$	$R^2 = .75,$ $F(2, 555) = 841.53,$	$R^2 = .39,$ $F(3, 554) = 117.31,$

	$p < .001$	$p < .001$	$p < .001$
Indirect Effects of Age on OBI via...	Effect (SE)	Boot CI_{LL-UL}	
Total Indirect Effect	-.26 (.06)	-.38 to -.15	
System Trust <i>only</i>	-.22 (.05)	-.34 to -.12	
System Trust → Institutional Trust	-.05 (.03)	-.12 to .004	
Institutional Trust <i>only</i>	.005 (.008)	-.004 to .04	

Notes. † $p < .10$, * $p < .05$, ** $p < .01$, $p < .001$

Table 4. Serial mediation analysis for the effect of generational cohort membership on online banking intentions mediated by system and institutional trust, respectively.

5 Discussion

The current study explored two competing models related to the mediating effect of institutional and system trust on the relationship between age or generational cohort membership and expressing online banking intentions. First, our results confirmed past research (Fox, 2013; Smith, 2014) that younger adults would express greater intentions to bank online compared to their older counterparts. Additionally, the ANOVA results showed that only Millennials reported significantly greater system than institutional trust. Thus, not only do older adults feel more comfortable and trusting of institutions than the Internet as a whole, but Millennials are the exact opposite.

The results of the serial mediation model showed that Model A, where age affects OBI through the serial combination of institutional and system trust, respectively, yielded a better solution than Model B, where system trust preceded institutional trust. From a theoretical point of view, this indicates that psychologically, online trust is a complex process and relies on incremental iterations of environmental appraisals combined with perceived risks, safety and security levels. Additionally, our findings showed that age matters when it comes to finding ways to influence technology adoption. Previous technology adoption models like the TAM (Davis, 1989) placed more emphasis on technology skillfulness factors without considering the ways in which biological, behavioral, and environmental factors affect technology adoption.

On a practical level, our findings provide financial institutions and system designers an opportunity to understand the dynamics of technology adoption as they relate to online banking. Considering that online banking is perceived a risky behavior, our findings showed that having strong trust in the institution is a precondition to developing trust in the system, which then can motivate or inhibit the adoption and use of technology. Thus, it is possible that financial institutions can increase their online banking use among older adults by first building institutional trust, but then incorporating system trust into the educational process. If individuals do not understand the benefits of security and privacy measures on the Internet as a whole then the seals and education about specific website security may do very little in generating online banking customers. An educational approach that incorporates system level discussions about the Internet or other new ICTs in general may be a better approach than simply addressing the security of the institutional website, which users will most likely already trust.

5.1 Limitations and Future Research

There are a few limitations worth noting. First, we used a cross-sectional survey to infer causal order. Despite the fact that our findings are derived and expand on existing theoretical models, we are unable to infer causal order with considerable certainty. Future research should test this model in other contexts and with the use of different methods (e.g., experiments). Second, our sample was comprised of MTurk users. While the sample is comparatively representative to the US Internet population, our findings might have been biased by the fact that respondents are already Internet users, thus we are unable to account for those who are not current users of online banking and the Internet in general. Future studies should consider using random samples. Finally, we relied on self-report measures of psychological responses and states, which could be constrained by social desirability. Future research should attempt at including unobtrusive measures (e.g., implicit tasks, psychophysiological measures, etc.). Lastly, we understand the institutional and system level metrics were not ideal, specifically, that the Internet could be considered a “system”. However, when thinking about the Internet people are generally unable to differentiate between websites, computers, phones, and the Internet. Thus, thinking about going “online” as a behavior is easier to explain or understand at an individual level and was used as our system variable.

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