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ABSTRACT

According to a recent study, insider data breaches cost companies on average $4.3m per year. Such data breaches also lower customer trust - which again has a long term negative impact on a company's financials. Yet there is limited research pertaining to the understanding of the contextual factors surrounding the "drop" in the trust in case of an insider data breach. In this research we perform a comparative examination of the effects of age and gender on initial trust in a website, and the degree of the trust "drop" following an insider data breach. The study uses the lens of social role theory, socioemotional selectivity theory (SST), and insideness theory (IT) to examine the role of four demographics (younger and older females, and younger and older males) on PC (privacy concern) dimensions, and the trust-dropped. The findings provide valuable contribution towards understanding the role of gender and demographics associated with PC and trust violation.

Keywords

Gender, Age, Insider Data Breach, Privacy Concern, Trust Violation

INTRODUCTION

Insider security breach is a serious security phenomenon. Such insider data breaches cost companies on average $4.3m per year (Darkreading.com 2016). Most of us realize that security breaches are caused by hackers, external to an organization, however, on close examination it is evident that a significant percentage of seemingly external hacks originate due to an accidental, malicious or negligent act by an employee or an insider. "Trusted" insiders could create gateways that can eventually allow malicious outsiders into the organization's otherwise secured networks and databases. The seriousness could be gauged by the fact that 43 percent of data breaches were caused due to negligent, malicious, or accidental employee activities (Seals 2015). Insider data breaches are expensive. Damages resulting from the 2013 Target data breach, caused due to an insider (trusted third-party contractor), are estimated to have cost the company $252 million – which does not account for the long-term indirect cost resulting from the decline in their customers' trust.

Relying on the social role theory of gender differences (Eagly 1997) and socioemotional selectivity theory (SST) (Carstensen et al. 1999), along with insideness theory of aging (Rowles 1978) this research examines the role of gender and age in the context of PC and trust formation as well as trust drop in case of an insider security breach incident. Social role theory of gender differences suggest that the behavior of men and women is shaped by social and cultural expectations. Socioemotional selectivity theory (SST) suggests that older adults often selectively restrict their social network to the group of familiar individuals with whom they have had rewarding relationships. SST suggests that older adults value emotional satisfaction and thus report fewer negative emotions. Insideness theory - IT (Rowles 1978) relates to three things: geographical (physical) insideness, social insideness and autobiographical insideness that reflect the attachment one develops to the physical space, social friends, and "memories" that shape one's self-identity respectively. SST and IT theories suggest that social, geographic and personal attachments provide valuable assurance, along with a sense of security and a positive sense of self (Lecovich 2014).

The research uses a scenario based approach. The data were collected from 800 individuals. This research measured and contrasted the trust decline across males and females from two age groups 18 to 40 and 41 to 81 (younger males: YM, older

males: OM, younger females: YF, and older females: OF). The research also controls for the known factors as suggested by Bansal and Zahedi (2015) such as familiarity (FAM), reputation (REP), design (DES), perceived seriousness of the breach news (SERIOUS), and trust propensity (TRPR).

The research provides interesting and insightful findings, and shows the confounding effect of age, gender, and PC dimensions (Smith et al. 1996) on initial trust and drop in trust. The findings also reveal interesting and novel facts about the role of control variables in shaping the trust drop differently for both men and women, older and younger, and for different PC dimensions. The paper is organized as follows: the next section presents a salient overview of the literature. Research model and hypotheses are presented next. In the following section, we discuss research methodology and results. The paper concludes by discussing the theoretical and practical implications along with the future research directions.

LITERATURE REVIEW

The following table (Table 1) provides overview of salient literature pertaining to the issues and themes covered in this paper. The literature review highlights that there is definitely value in examining the role of age and gender on trust drop, and at the same time it reflects on the nature of scant research in this area.

Area	Source	Key Finding
Insider breach	Chen et al. 2015	Examine how components of information security programs affect security culture.
	Chen et al. 2013	Findings suggest that monetary rewards could prevent security breaches.
Trust and Age	Yoon and Occeña (2015)	Age affects trust in customer-to-customer online commerce.
Trust violation / repair	Bansal and Zahedi 2015	Empirically examine how hacking and unauthorized sharing affect trust-violation and trust-repair.
	Choi et al. 2016	Examine customer reactions to a company's restoration activities following a breach.
Relationship between PC and Gender	Chen et al. 2013	Studied gender differences in PC pertaining to information handling and gathering

Table 1. Literature Review

RESEARCH MODEL

Social role theory of gender differences (Eagly 1997) suggest that due to division of labor, and different social and cultural expectations men and women have different social behaviors, hence suggesting that they would have differences in levels of PC as well. Similarly, SST (Carstensen et al. 1999) and social insideness theory (Rowles 1978) argue that younger and older adults value "social attachments" differently suggesting that their level of PC might not be same. Using social role theory, it could be argued that men have been traditionally in more "control" positions and hence would have higher PC, since PC also pertains to being in "control" of how one's information is being used. Similarly, using SST and IT it could be argued that older adults would tend to minimize negative emotions and optimize social interactions (SST), and value prior familiarity and social attachments (SST, IT) hence their PC level would be different from those for younger adults.

Prior research shows that men / women, and younger / older adults have different PC levels. Fogel and Nehmad (2009), Hoy and Milne (2010), and Sheehan (1999) suggest that women have higher PC than men. Chen et al. (2013) argue that males value independent thinking, control and autonomous behavior, hence would have higher PC than females. Anonymous (2014), and Van den Broeck et al. (2015) suggest that older adults are more concerned about privacy of their information than younger adults. However, Hoofnagle (2010) and Rainie (2016) suggest that young adults have higher PC. Thus, using arguments from social role theory, and, also from SST and IT, along with the prior empirical evidence, it could be argued that males and females – younger and older, have different concern levels for the four PC dimensions i.e. collection, secondary use, unauthorized access and error. Hence,

Hypothesis1: The level of PC (collection, secondary use, unauthorized access and error) is not same for all four demographic groups: young males, young females, older males, and older females

PC is known to negatively impact Trust (Bansal et al. 2010), and is also known to impact repaired trust after trust violation (Bansal and Zahedi 2015). Studies show that there are gender differences pertaining to the relationship between trust and

subsequent behaviors such as intention to shop (Awad and Ragowsky 2008), similarly it could be argued that there would be gender differences pertaining to relationship between trust and its antecedent (i.e. PC). Using lens of social role theory Porter et al. (2012) argued in the context of online community that one's belief about enabling interaction by the online community provider would lower one's risk beliefs pertaining to the opportunistic behavior on behalf of the community provider, and the relationship would be stronger for women than for men. Since PC disables interaction (by lowering intention to share information – Bansal et al. 2010), it could be argued that lower PC would enable interaction by increasing trust in the website – and this effect will be stronger for women. Moreover, in the context of C2C, Yoon and Occeña (2015) found that trust levels change with age. Using Social insideness and SST theory lens it could be argued that older adults would engage in behaviors and strategies that optimize positive social experiences and minimize negative ones by avoiding conflicts (Luong et al. 2011). Similar ideology is echoed by Bal et al. 2011 who argued that older workers focus more on maintaining their relationships with others, and therefore are milder in their response to "unfair treatment" (p 66). Thus, it could be argued that PC would impact initial trust formation, and, also trust drop in case of an insider breach, and that the effect would be moderated by both age, and gender of the users as well. Hence,

Hypothesis 2: PC (collection, secondary use, unauthorized access and error) impact: (a) initial trust formation in a website differently for each of the four demographic groups; (b) the trust drop in case of an insider breach differently for each of the four demographic groups.

Research model in figure 1 depicts the two hypotheses.

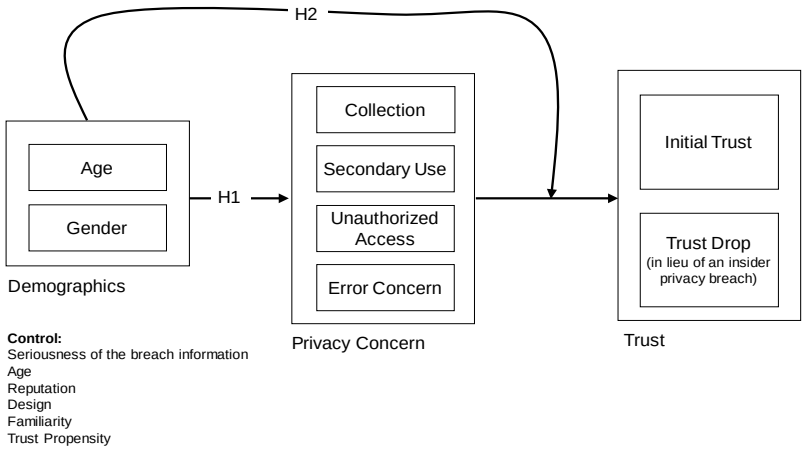

Figure 1. Research Model

RESEARCH METHODOLOGY

Items

PC, Trust, Reputation, Familiarity, Design, Seriousness of the news, and Trust propensity items were taken from Bansal and Zahedi (2015). We created the insider breach news vignette. We used scenario-based controlled experiment since it allows the researchers to control for extraneous factors, and is known to be fairly accurate (Bansal and Zahedi 2015).

Data Collection

Data was collected with the help of an experimental design created using Qualtrics. Respondents were asked to view a website, and then were asked to answer questions pertaining to initial trust (T1), design, reputation, and familiarity with the website. Next the respondents were asked to view a fictitious news vignette. The news vignette was created to prime the respondents about insider breach event that just occurred. We measured perceived seriousness of the news. Trust in the website was measured again (T2). We also collected data on PC, age, and gender. Respondents were also quizzed to make sure that they have understood the scenario correctly. Data were collected from students and families living in a Midwestern region. 800 unique respondents completed the experimental survey. Only 651 of 800 respondents answered the three quiz questions correctly. We included only these 651 in our analysis. We divided our sample into four groups: younger males (YM), older males (OM), younger females (YF) and older females (OF). We used 18-40 as young category, and 41 and above as older category – consistent with demarcations suggested by Kail and Cavanaugh (2012). Table 1 provides mean age values for these four groups. It seems that younger groups (YM and YF) and, also older groups (OM and OF) were mostly similar in terms of age.

Data Analysis

Before conducting the analysis we cleaned the data. We also performed exploratory factor analysis to identify the items that demonstrate high factor loadings, and low cross loadings. All items in our research demonstrate loadings of .70 and above, and cross loadings of less than .40, with exception of thee unauthorized access items which have cross loadings of .41~.55 with error concern, and COL2 item that had cross loading of .41 with secondary use concern. Since these are well established items we decided to include them in the analysis (Shamir et al. 1998). We then averaged the items to generate the respective constructs (Shamir et al. 1998). We also examined reliability using CFR. Discriminant and Convergent validity were examined using construct correlations and square root of AVE. No issues were found. We then examined H1 using ANOVA with LSD posthoc comparisons. We examined H2 using OLS Regression. We also examined the regression assumptions for all four demographic groups, and found no issues (Appendix A).

Results

Results for H1 are shown in Table 2, and discussed below. We compared differences in PC dimensions among the four demographics (YM, OM, YF, and OF). There are several important findings pertaining to H1. First, it seems that overall, older population has higher PC than younger population across all four PC dimensions. Second, there is no significant difference between YM and YF for all the four PC dimensions. Lastly, OM are more concerned than OF for secondary use, and OF are more concerned than OM for error concerns.

	Collection		**Secondary Use**		**Unauthorized Access**		**Error**	
	Sig.	**>/<**	**Sig.**	**>/<**	**Sig.**	**>/<**	**Sig.**	**>/<**
YM-OM	0.000	YM < OM	0.006	YM < OM	0.008	YM < OM	0.041	YM < OM
YM-YF	ns		ns		ns		ns	
YM-OF	0.000	YM < OF	0.000	YM < OF	0.000	YM < OF	0.000	YM < OF
OM-YF	0.012	OM > YF	0.006	OM > YF	0.004	OM > YF	0.001	OM > YF
OM-OF	ns		0.022	OM > OF	ns		0.019	OM < OF
YF-OF	0.000	YF < OF	0.000	YF < OF	0.000	YF < OF	0.000	YF < OF
Overall	(OM = OF) > (YM = YF)		OM > OF > (YM = YF)		(OM = OF) > (YM = YF)		OF > OM > (YM = YF)	

Table 2. Results for Hypothesis 1

The results for H2 (Figure 2) show that the out of the four PC dimensions it is primarily the error concern that impacts the initial trust and trust drop (at p<.05 or less), and does that differently for younger-/older- and men/women. Few things to note here: first, error concerns significantly and positively impacting the trust drop for the overall sample (p <.05 level); second, error concerns negatively impact initial trust formation for younger females (at p<.05 level); third, these concerns aggravate the trust drop for younger males (at p<.05 level);, and lastly, it seems that effect of error concerns on young males in trust drop is stronger (□=.345) than the effect of these concerns on younger females (□=-.147) in initial trust formation. Other significant findings (at p<.10 level) are: collection concerns positively impacting trust drop for older females, and unauthorized access positive impacting initial trust for younger females – both at p<.10 level (two-tail). The later with a positive impact on initial trust is a surprise finding, and needs to be explored further.

Next we discuss our findings related to the control variables. *Seriousness:* the results suggest that seriousness significantly impacted the trust drop for all the four demographic groups at .05 level, except for OM which was significant at p<.10 level. Overall also, there was a significant impact of news seriousness on trust drop. *Age:* Age had overall negative impact on trust drop (p value < .05), however age had no significant impact on trust drop or trust formation for individual demographics. *Familiarity:* Familiarity plays a role in both trust formation and trust drop process. It enables the trust formation in the overall sample, and also for YF and OF (and not for males), and it cushions the drop for overall sample (p<.05 level), and also for YF (at p < .005) – providing evidence that familiarity plays a very strong role in cushioning the trust drop for younger females. Reputation and Design played on role in trust drop at all; however, they positively impacted all the four demographics (and overall sample as well) in initial trust formation with one caveat – reputation didn't impact OF in trust drop. Similarly, trust propensity played no role in trust drop, however it did impact initial trust formation positively for all four demographics – with one exception – trust propensity was negatively associated with initial trust formation for older females.

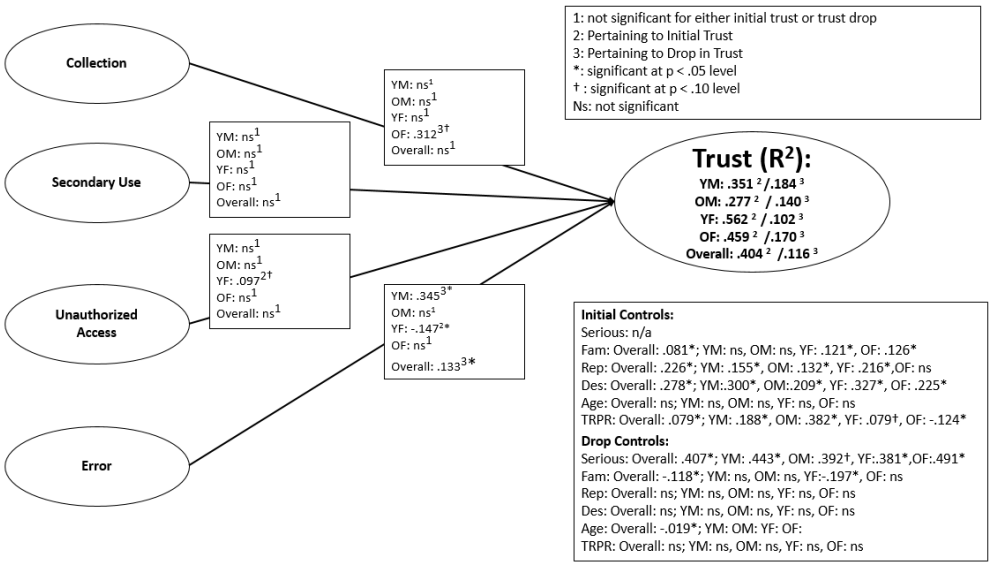

Figure 2. Results for Hypothesis 2

DISCUSSION

Overall, the findings support both the hypotheses - and have theoretical as well as practical implications. The findings show that PC dimensions differ across age / gender demographics. Particularly we found that older men are more concerned for secondary usage, and older women are more concerned for error dimension. However, young men and women have equal PC level across all four dimensions – suggesting that with increasing similarities in men and women job profiles, engineered differences due to the division of labor (which is one of the key arguments of social role of gender differences) are probably getting blurred and obscured. Thus, this finding both supports and adds to the social role theory of gender differences. The H1 findings also confirm IT that as people get older they not only become attached to the place where they live but they also become "more sensitive and vulnerable to their social and physical environment" (Lecovich 2014, p. 24). The findings thus add to the IT literature by showing that the theory might be applicable not only to the *geographical* places where aging population lives, but also to the *online* places where they do business with.

Similarly, findings pertaining to H2 show that error concerns play much stronger role than previously thought – both in the initial trust formation, and the subsequent trust drop in case of an insider breach – and in both cases impacting younger adults. The findings comply with SST that older adults have fewer negative emotions and are milder in their response to unfair treatment – insider breach in this case. Same is also corroborated by weaker significance level for older males for impact of perceived seriousness of the insider breach news on the trust drop. Use of SST in this fashion, adds to the SST and, also to the trust, and privacy literature.

One overall theme that emerges from the findings is that even though older adults have higher PC, for any given degree of PC, it is the younger adults who lose more trust in case of an insider breach. The results thus support social insideness theory and SST by suggesting that that older adults are selectively cautious, and also tend to minimize negative experiences, and avoid conflict.

To summarize, the research has the following contributions: 1. It adds to the debate concerning the privacy concern level of older vs. younger, and men v. women; 2. it provides a novel examination using SST and IT theories to online trust violation, this extends the theories as well as trust – privacy literature; 3. This research shows that the relative importance of the four PC dimensions (Smith et al. 1996) is probably shifting, collection, unauthorized access, and secondary use – hitherto Big 3 – seem to have ceased their "fear factor". This needs to be explored further; 4. it provides contextual examination of trust drop – which is an increasingly important area to study, as data breaches become more frequent, and more severe; especially so as there are limited research studies in this domain except for few such as Bansal and Zahedi (2015) and Kim and Jack (2016); 5. it shows that not all trust (initial) building mechanisms provide "cushion" during the trust drop; and these mechanisms act differently depending on one's age and gender; and lastly, 6. it shows the negative trust impact associated with insider breaches. The research has practical implications as well - making sure that the users are assured that their info is correct – especially when dealing with younger adults – should be on the radar of all data and privacy managers – this will help build initial trust, and will help in cushioning the blow, when events such as insider breach occur.

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Appendix A: Regression Assumptions

Younger Males		Older Males		Younger Females		Older Females	
Normality	Linearity and Equal Variance	Normality	Linearity and Equal Variance	Normality	Linearity and Equal Variance	Normality	Linearity and Equal Variance