

Trust Drops when Insiders Drop the Ball: The Role of Age, Gender, and Privacy Concern in Insider Data Breaches

Full Paper

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Abstract

Recently data breaches, and insider data breaches in particular, have become more common. However, there is limited research examining the factors associated with the “drop” in the users’ trust in response to such an event. This research uses the lens of social role theory and procedural justice to understand the role of age (younger-older) along with biological (male – female) and cultural (masculinity – femininity) gender, and the four privacy concern (PC) dimensions - collection, secondary use, unauthorized access and error, on initial trust and corresponding trust drop associated with three trust dimensions - ability, benevolence, and integrity. The study uses a scenario-based approach focusing on an insider breach vignette. The findings also provide a helpful insight into the comparative roles of usual trust builders (e.g., reputation, design), and trust crashers (e.g., privacy concern) in the process of trust drop on different demographics (e.g., older and younger, males and females).

Keywords

Gender, Age, Insider Data Breach, Privacy Concern, Trust Violation, Ability, Benevolence, Integrity

Introduction

Insider security breach is a serious security phenomenon. Such insider data breaches cost companies on average \$4.3m (Darkreading.com 2016). 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). These breaches are expensive. Damages resulting from the 2013 Target data breach are estimated to have cost the company \$252 million – which does not account for long term indirect costs resulting from the decline in the users’ trust.

Relying on the social role theory of gender differences (Eagly 1997) and socioemotional selectivity theory (SST) (Castensen et al. 1999), along with the social 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 response to an insider security breach incident. The social role theory of gender differences suggests that the behavior of men and women is shaped by social and cultural expectations. Social insideness relates to the social relationships and attachment that the person develops with others with age, and suggests that these attachments provide valuable assurance, along with a sense of security and a positive sense of self (Lecovich 2014). Since it is known that culture determines gender roles and what is masculine and feminine, the research examines if the biological gender is any different from “cultural” gender when it comes to PC and trust issues.

The research uses a scenario based approach. The data were collected from around 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 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 rest of the paper is organized as follows: the next section presents a salient overview of the literature. The 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 future research directions.

Literature Review

The following table provides an overview of salient literature pertaining to the issues and themes covered in this paper. The literature review provides support to the arguments made in this research that there is merit in examining the moderating role of age and gender on the relationships between privacy concern dimensions, cultural aspects – especially masculinity, initial trust, and drop in trust in response to an insider data breach incident. The literature review, at the same time, highlights that very little research is conducted in this area.

Area	Source	Key Finding
Insider breach	Chen et al. 2015	Examined 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	Found that age affects trust in customer-to-customer online commerce.
Trust violation / repair	Bansal and Zahedi 2015	Empirically examines how hacking and unauthorized sharing affect trust-violation and trust-repair.
	Choi et al. 2016	Examined 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.
Trust Dimensions and PC	Bansal and Zahedi 2015	Studied the impact of the violation-repair process on trustworthiness beliefs (ability, integrity, and benevolence).
Culture and Masculinity	Hitosugi 2009 (doctoral dissertation)	Studied direct relationship between culture and online trust. Found that the dimensions of masculinity/femininity had no direct effect on trust formation in an online environment.

Table 1. The Literature Review

Research model

Social role theory of gender differences (Eagly 1997) suggests 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 insiderness 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 SIT and SST it could be argued that older adults would tend to optimize social interactions and hence would have lower PC.

Prior literature and research (e.g., Chen et al. 2013, Rainie 2016) supports both the notions that men, and younger adults have higher PC than women, and older adults respectively; and, also vice versa. Fogel and

Nehmad (2009), Hoy and Milne (2010), and Sheehan (1999) suggest that women have higher PC than men, and Anonymous (2014), and Van den Broeck et al. (2015) suggest that older adults are more concerned about the privacy of their information than younger adults. Thus, using arguments from social role theory, and, also from SIT and SST, 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.

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 the relationship between trust and its antecedent (i.e. PC). Using the lens of social role theory Porter et al. (2012) argued that in the context of an online community 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 insiderness and a 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 response to an insider breach, and that the effect would be moderated by both the age and gender of the users as well. Hence,

Hypothesis 1: Trust antecedents impact: (a) initial trust formation toward a website differently for each of the four demographic groups; (b) the trust drop in response to an insider breach differently for each of the four demographic groups; and (c) the above relationships would vary based on the underlying trust dimension (i.e. ability, benevolence, integrity, as well as overall trust).

The research model in Figure 1 depicts the above hypotheses.

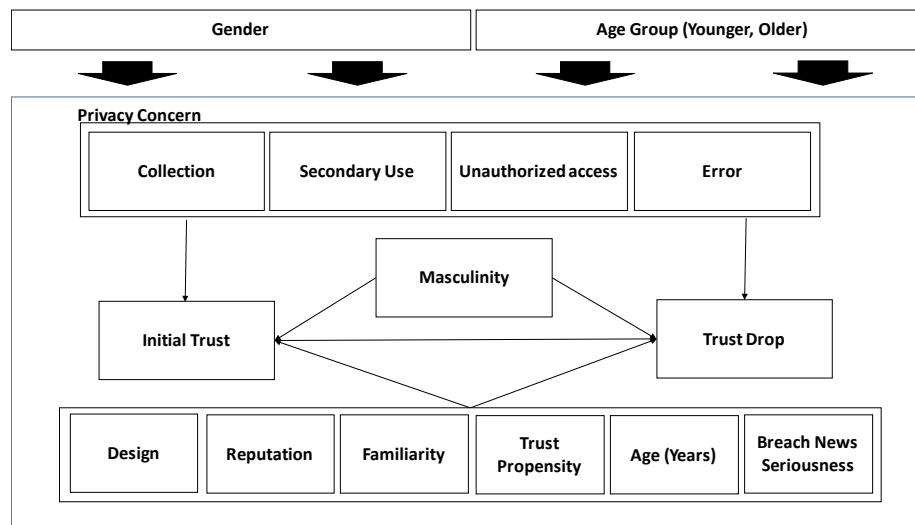


Figure 1. Research Model

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 a 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 factious news vignette. The news vignette was created to prime the respondents about an 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, trust propensity, age, gender and masculinity (cultural gender). Respondents were also quizzed to make sure that they understood the scenario correctly. Data were collected from students and families living in a Midwestern region. 800 unique respondents completed the experimental survey. Only 525 of 800 respondents answered the three quiz questions correctly. We included only these 525 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 ages 18-40 as the younger category, and age 41 and above as older category – consistent with demarcations suggested by Kail and Cavanaugh (2012). Table 2 provides mean age values for these four groups.

	Males	Females	Young Males	Older Males	Young Females	Older Females	Missing Gender Value
Number	190	330	104	86	183	147	5
Age Range (in Years)	18-73	18-81	18-39	41-73	18-40	41-81	23-55
Age Mean (in Years)	36.423	36.600	24.010	51.612	24.355	51.844	37.800
Age Std Dev (in Years)	14.676	14.972	4.671	5.577	5.525	6.724	15.418

Table 2. Demographics

Data Analysis

We first examined the reliability of the items using CFR. We then examined the discriminant and convergent validity of the items using construct correlations and the square root of AVE. Trust drop (i.e. T1-T2) was modeled as a latent variable comprising of items corresponding to differences between initial trust items (T1) and violated trust items (T2) respectively (McArdle and Prindle 2008). We performed CFA analysis to examine the measurement model Table 3). Chi-square / df ratio was observed to be less than 3.0 for all models, CFI, TLI, RMSE and SRMR met the required thresholds for CFA models when analyzed as “one” group. Fit indices were slightly lower than the recommended threshold for models using “group analysis”. We examined CMV three different ways - (a) first factor explained only 28.372% of the variance; (b) correlations between the marker variable and other variables were less than .158; (c) Chi-square of the CFA model, which had all items loading onto one “common” construct (with correlations between the “common” and other latent constructs set to 0), was significantly different from the chi-square of the regular CFA model (203.096, df=71, p = .000). The analysis suggests that CMV does not pose a significant threat. The fit indices are given in Table 3.

	Overall Trust		Integrity		Benevolence		Ability					
	Meas. Model		Meas. Model		Meas. Model		Meas. Model		Est. Model			
	#	##	#	##	#	##	#	##	#			
Chisq/df	1.82	2.44	1.81	1.87	2.49	1.87	1.96	2.70	1.93	1.94	2.68	1.92
CFI	.89	.94	.89	.88	.93	.87	.87	.93	.87	.87	.93	.87
TLI	.87	.93	.87	.86	.92	.85	.85	.92	.85	.85	.92	.85
SRMR	.06	.04	.06	.06	.04	.07	.06	.04	.06	.06	.04	.06
RMSEA	.08	.05	.08	.08	.06	.08	.09	.06	.09	.09	.06	.09

#: Dataset includes all 525 respondents; ##: Model estimation / CFA performed using group analysis for four groups - YM, OM, YF, and OF; Est. Model: Estimation Model; Meas. Model: Measurement Model

Table 3. Fit Indices

Results

Results are shown in Figures 2~5, and summarized in Table 4.

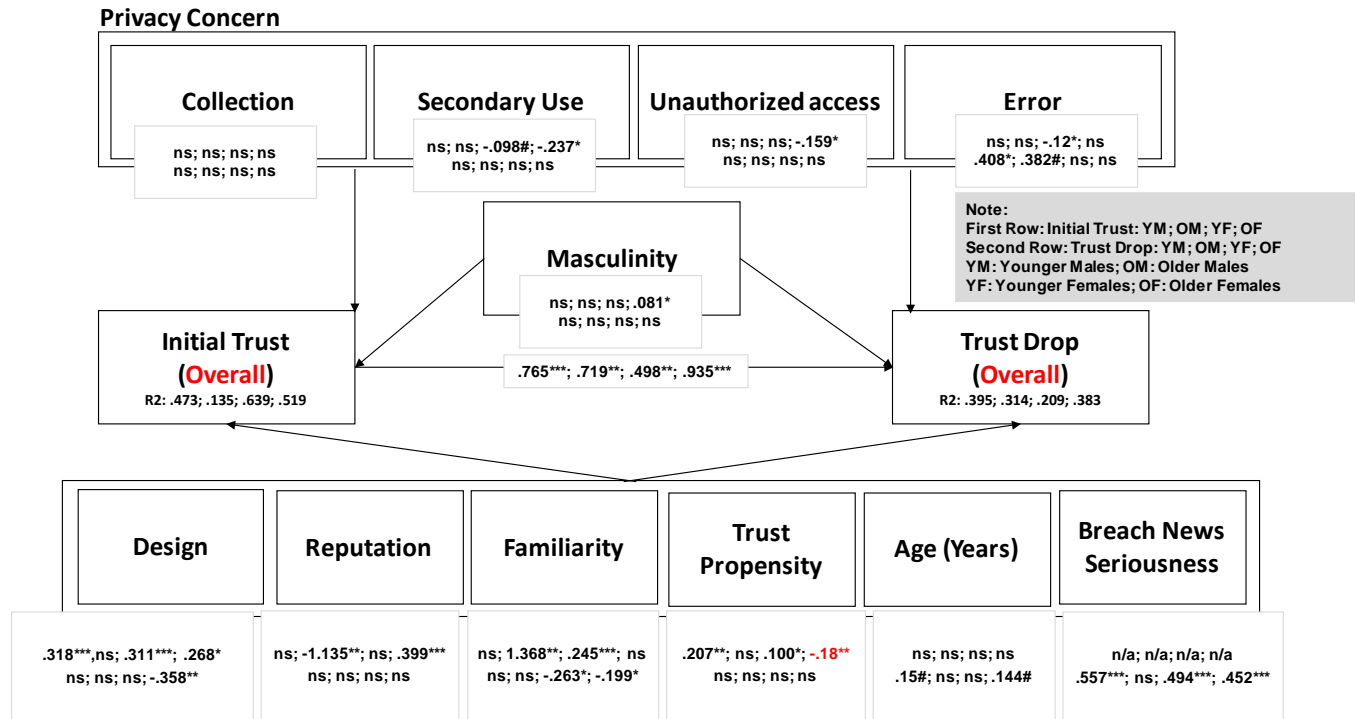


Figure 2. Results (Overall Trust)

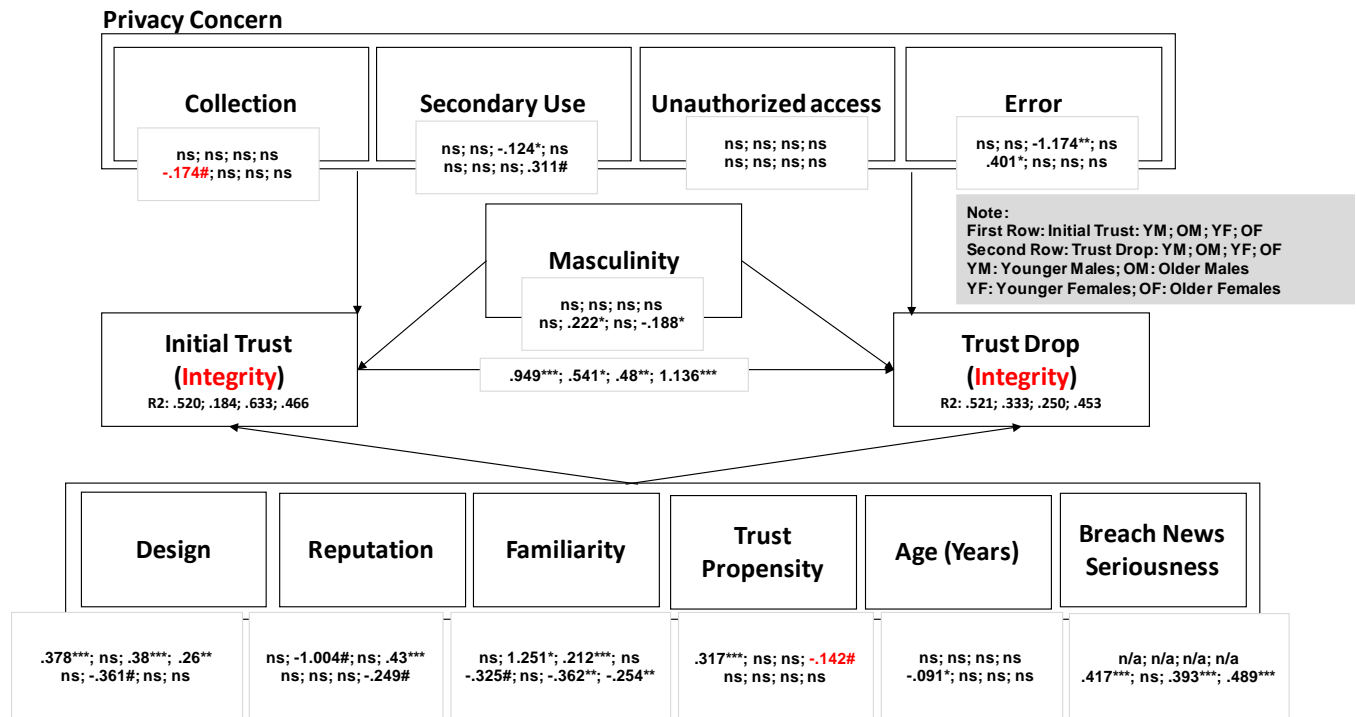


Figure 3. Results (Integrity)

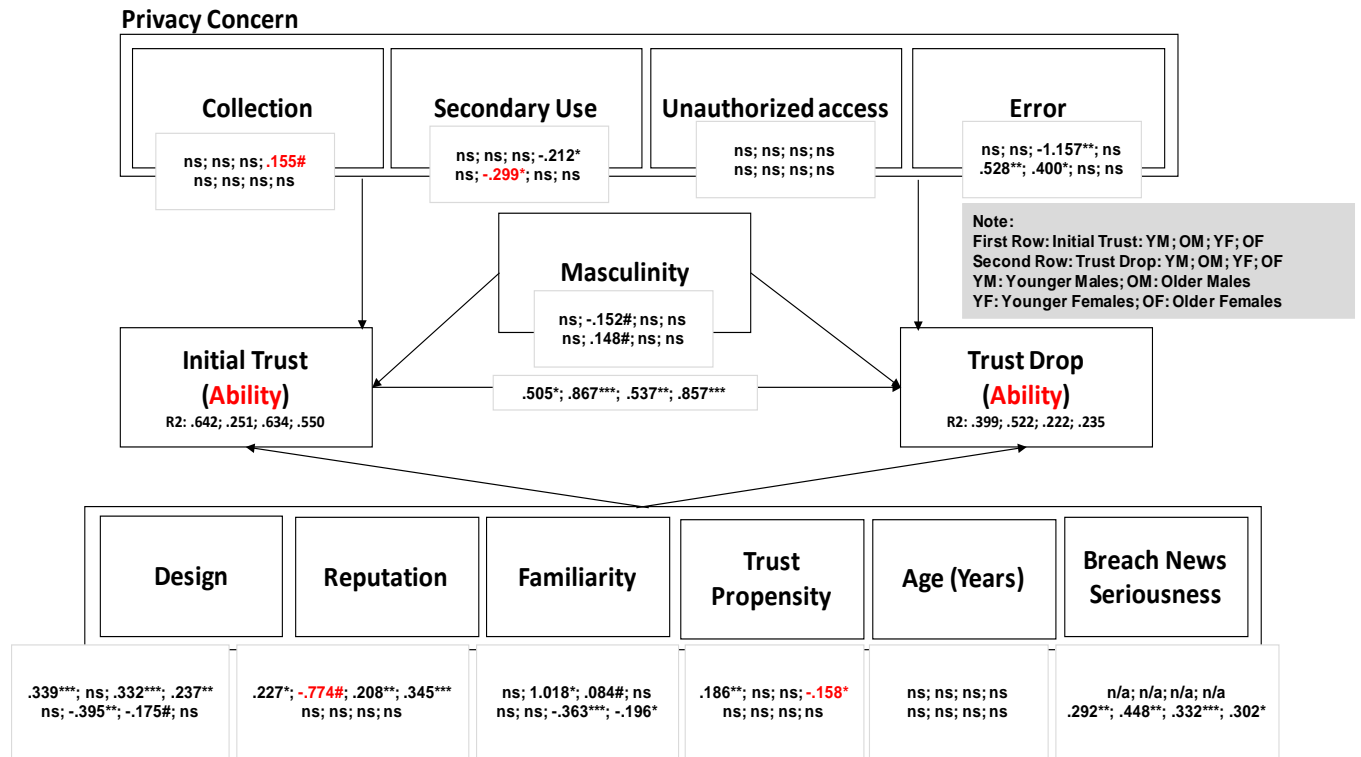


Figure 4. Results (Ability)

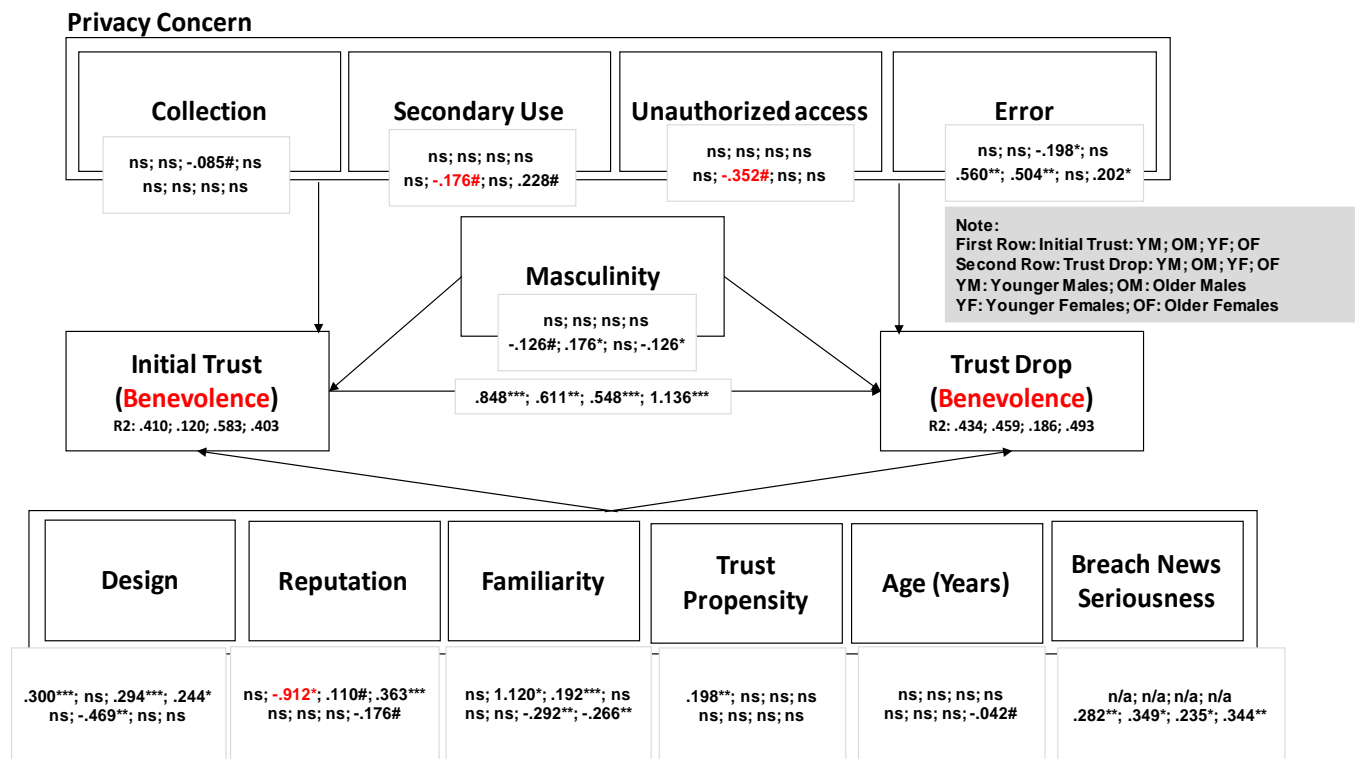


Figure 5. Results (Benevolence)

Link	Younger Males	Older Males	Younger Females	Older Females	Remarks
Initial Trust to Trust Drop	+	+	+	+	Higher initial trust causes higher drop. For all trust types, the relationship is stronger for older females than for younger females and younger males; younger males than for older males and younger females.
	I>B>O>A	A>O>B>I	B>A>O>I	B,I>O>A	
TRPR to Initial Trust	+		+	-?	Positively impacts younger males for all four trust types, and does not impact older males at all. Positively impacts younger females, and negatively impacts older females.
	I>O>B>A		O	O>A>I#	
TRPR to Trust Drop					Trust propensity does not cushion or aggravate the trust drop.
Design to Initial Trust	+		+	+	Design helps all but older males to build initial trust, and helps cushion trust drop for all except younger males.
	I>A>O>B		I>A>O>B	O>I>B>A	
Design to Trust Drop		-	-	-	
		B>A>I#	A#	O	
Reputation to Initial Trust	+	-?	+	+	Has broader impact on older females.
	A	O>B>A#,I#	A>B#	I>O>B>A	
Reputation to Trust Drop				-	Reputation has a mild cushioning effect only on older females
				B# I#	
Familiarity to Initial Trust		+	+		Impacts only older males and younger females; impacts younger females in all trust areas more than it does older males (except for ability)
		O>I>B>A	O>I>B>A#		
Familiarity to Trust Drop	-		-	-	Provides cushion primarily for females - bigger cushion for all four trust types for younger females.
	I#		A>I>B>O	B>I>O>A	
Masculinity to Initial Trust		-		+	Impacts older females positively and older males negatively.
		A#		O	
Masculinity to Trust Drop	-	+		-	Doesn't impact younger females at all. Definitely touches benevolence. Impact on ability is marginal.
	B#	B>I>A#		I>B	
Collection to Initial Trust			-	+?	Positively impacts older females and negatively impacts younger females.
			B#	A#	

Link	Younger Males	Older Males	Younger Females	Older Females	Remarks
Collection to Trust Drop	-				Cushions drop in integrity# for younger males.
	I#				
Secondary use to Initial Trust			-	-	Impacts only women. Impacts integrity in younger females and ability in older females.
			I>O#	O>A	
Secondary use to Trust Drop		-?		+	Lowers trust drop for older males and increases trust drop for older females
		A>B#		B# I#	
Unauth Access to Initial Trust				-	Limited impact. In older females it has negative impact on overall trust
				O	
Unauth Access to Trust Drop		-?			Limited impact. Contrary to belief, it cushions the drop in benevolence for older males.
		B#			
Error to Initial Trust			-		Lowers initial trust for younger females in all four Trust areas
			I>A>B>O		
Error to Trust Drop	+	+		+	Aggravates trust drop for benevolence. Broadest and biggest impact on younger males. Greater impact on older males than older females.
	B>A>O>I	B>A>O#		B	
Seriousness to Trust Drop	+	+	+	+	Impacts integrity the most except for older males. Impacts ability more than benevolence except for older females.
	O>I>A>B	A>B	O>I>A>B	I>O>B>A	
Initial Trust		L: Amongst the lowest R ² for all trust types	H: Amongst the highest R ² for all trust types		Out of the four trust types, in general, benevolence has the lowest, and ability has the highest R squares for all four demographics. Moreover, between integrity and overall trust models: overall trust has relatively higher R squares for females, and integrity has relatively higher R squares for males.
Trust Drop			L: Amongst the lowest R ² for all trust types		The highest R ² for younger males and also for younger females for all four trust types was for integrity drop. The highest R ² for older females was for benevolence; and the highest R ² for older females was for ability. Overall, younger females had the lowest R ² .

Table 4. Result Summary

Note: L: Amongst the lowest R² for all trust types; H: Amongst the highest R² for all trust types; # p value < .10 level

Discussion

Our main hypotheses was supported. The results overwhelmingly show that there is a moderating impact of age and gender on the variables impacting initial trust, and trust drop in response to an insider breach. Results also point to the relative importance of the four privacy concern dimensions in their role on trust formation and decline in response to an insider privacy breach, and also on the relative role of the four trust types – overall trust, ability, benevolence and integrity, in this process. The research provides several interesting insights as highlighted and summarized in Table 4. The research findings suggest some interesting patterns.

Masculinity: Hitosugi (2009) found that masculinity has no direct impact on trust – but our research shows that it does – it just depends upon trust dimension, age and gender.

Privacy concern: It seems PC impacts initial trust formation only for females. Out of all four PC dimensions, error seems to have significantly broader impact on younger females on all trust types (overall, ability, benevolence, and integrity). Younger females are also concerned about secondary use and that lowers their initial trust in integrity. The story is different when it comes to the role of PC in impacting trust drop – PC seems to have more impact on males than on females, and none on younger females in particular. PC – especially error concerns aggravate the drop for males (more so for younger males), and impacts benevolence more than anything else.

Perceived seriousness of the breach: This dimension impacts all demographics, and impacts integrity the hardest for most people (except for older males); and impacts ability more than benevolence (except for older females).

Trust builders: The usual trust builders: reputation, design, familiarity and trust propensity have different roles when it comes to four different trust types, for four different demographics, and for two different scenarios – initial trust and trust drop in response to an insider data breach. These “builders” help establish initial trust and also help cushion the trust drop in response to the data breach. It seems these “builders” have practically no impact on younger males in cushioning their trust drop. It seems that familiarity plays a very strong and broader role across all four trust types in cushioning the drop, especially for females, both younger and older, albeit in a slightly different fashion. Familiarity cushions ability more than anything else for younger females, and it cushions benevolence more than anything else for older females. The magnitude of the cushion provided by familiarity to younger females is also much stronger as compared to the older females. Design and trust propensity are great initial trust enablers for younger males, and design and reputation are great enablers for older females. Design and familiarity seem to work best for younger females. Apparently, nothing pleases older males, more than familiarity itself when it comes to initial trust.

Initial trust and trust drop: The more one trusts a business, the more one gets “hurt” in response to an insider data breach. The impact on different trust dimensions depends upon the underlying demographics – Integrity gets impacted the most for younger males and older females; whereas, ability gets impacted the most for older males, and benevolence the most for younger females. Pairwise t-test analysis shows that for initial trust - overall trust > integrity > ability > benevolence for all four demographics (with the exception that for younger and older females overall trust was not different from integrity at $p < .05$). However, in the case of trust drop the story was slightly different. The pairwise t-test analysis for the percent drop in trust shows that overall trust > integrity > benevolence > ability for all four demographics (with the exception that for both older males and older females where the percent drop in ability was not different from the percent drop in benevolence at $p < .05$; and older males had O not different from I). This suggests that humans in general (across all four demographics) develop initial trust in ability more than benevolence, but when in response to an insider breach, the corresponding drop is higher for benevolence than it is for ability for the younger population, and the corresponding drop in ability and benevolence are roughly similar for the older population.

Conclusion

The findings provide a useful and interesting insight into the roles of usual trust builders (e.g., reputation, design), and trust crashers (e.g., privacy concern, seriousness of news) and show that they have different roles when considering four different trust types, for four different demographics, and for two different scenarios – initial trust and trust drop in response to an insider data breach. The research not only has deep theoretical implications but also several practical implications. There is scant research available on trust violation and restoration, and limited research on the comparative analysis of gender and age related issues.

This research shows the importance of longitudinally examining the impact of different PC dimensions on different demographics and on different trust types. Even though this research is based on unauthorized access to the users' data, it seems that the key concern is not who hacks, but who gets it right!

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