

A Study of Factors in HIPAA Non-Compliant Behavior

Completed Research

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Abstract

The 1996 Health Insurance Portability and Accountability Act (HIPAA) implemented safeguards to regulate the use and disclosure of personal health information. Even though the number of data breaches has declined, the number of affected individuals and total losses have increased. Trusted insiders are an emerging threat, because they have access to systems, administrative privileges and skills to disclose health information for monetary benefit. This study uses economics of crime literature and expected utility theory to model the relationships between risk aversion, risk perception, HIPAA knowledge and intention of violating HIPAA. We also examine the influence of gender and narcissism on risk aversion. A scenario-based survey design was used to examine the structural model. We find risk-aversion and HIPAA knowledge increase the perception of getting caught. This will in turn, affect the incentive amounts required to violate HIPAA regulations. Females are found to be more risk-averse than males. Interestingly, individuals rate high on the narcissism scale are more risk-averse. Contributions to the extant economics of crime and risk bodies of literature as well as practical implications are discussed.

Keywords

Non-compliance, HIPAA, Incentive, Risk Aversion, Narcicism.

Introduction

Information security is always the managerial priority of organization, because the loss on monetary as well as reputation due to information disclosure could be enormous. Even though the healthcare industry in the US is one of the most regulated industries, the issue of health information breaches is severe. In 2017 more than 14.6 million people were affected by data breaches and, there has been a significant rise in the number of healthcare data breaches in 2017 from 2016 (www.hipaajournal.com). Cybersecurity firms are in consensus that healthcare data breaches will continue to increase. Some of these breaches are simply malicious attacks, but often they are the result of the internal information leakage. The economic incentives, deterrence, and other factors play roles on the behavior of disclosing information.

The Health Insurance Portability and Accountability Act (HIPAA) of 1996 introduced legislation for protecting the privacy of personal health information through two guidelines. First, individual medical data can be used and disclosed only for purposes of treatment, payment, and healthcare operations (Act 1996; Stevens 2003); second, participants have to build and implement a complete security policy and systems

(Cao et al. 2003). To date, the HIPAA is a popular regulation that is widely followed (Lee et al. 2011), however, failure of compliance is possible when a legal user delivers decrypted medical data to an unauthorized person (Lee et al. 2011). More often, insiders who have privileges, skills, knowledge, resources, access, and motives circumvent security countermeasures, steal valuable data, and cause breaches (Wang et al. 2015; Willison and Siponen 2009). Failure to comply with HIPAA can result in civil and criminal penalties (www.ama-assn.org); based on this claim, we link the disclosure of health information, i.e., violating HIPAA to criminal theory. Crime as a risky behavior has been extensively discussed in prior academic literature (Becker 1968; D'Arcy et al. 2009; Wang et al. 2015). We investigate how the intention of committing crime, especially in the case of violating HIPAA correlates with risk aversion (human trait), risk perception (situation-based state), and HIPAA knowledge.

We identify three avenues for further advancing this stream of research. First, risk aversion itself is widely studied, but little effort has been made to link those studies to criminal activity, especially the health information disclosure in our setting. Both the general trend of risk aversion among the entire population and the various characteristics among genders and socio-economic statuses have been reported. The relationships of risk aversion to other non-financial risky activities, such as smoking, seat belt use, preventative healthcare, and preventative dental care were also examined (Hersch 1996). Dohmen et al. (2005) investigated how does risk aversion correlate with traffic offenses. With a sample size of 40, Block and Gerety (1995) empirically showed that incarcerated individuals are less risk averse than the general population in laboratory settings. However, a closer look at the literature in this area indicates that all direct studies of both risk preferences and criminal activity have been severely limited (Dolder 2017). Thus, it is important to explore the relationship between risk aversion and criminology, especially the correlation of the risk perception on the possibility of getting caught if violating the regulations.

Second, the literature is salient on the relationship between the knowledge of law/regulation (e.g. HIPAA) and the risk perception of the penalty, especially the probability of getting caught. Prior studies examined the association between the knowledge of HIV and the perceived risk of HIV transmission-related risky behavior (Baldwin and Baldwin 1988; Bazargan et al. 2000). McCauley et al. (2002) studied the pesticide knowledge and risk perception among adolescent Latino farmworkers. Burger et al. (1993) investigated the knowledge and risk perception of fishing in contaminated water in New York City. Thus, there could be an impact of law knowledge on the risk perception of violating the law and it is important to investigate this relationship.

Third, we empirically test the expected utility (EU) theory in the context of HIPAA violation. EU theory stated that individuals are rational and will make decisions that can maximize expected utility (Gopal and Sanders 1998; Yoo et al. 2014). Based on EU theory and given the assumption that one would end up with violating the law, the expected gain would increase as the risk perception (expected loss) increase. Although the EU theory sheds lights on this argument, the literature is yet to test it empirically.

Having identified the gaps in the literature, we ask two research questions: 1. How does risk aversion and HIPAA knowledge of a person impact the risk perception of getting caught if violating HIPAA regulations? 2. How does the risk perception of violating HIPAA regulations correlate the amount of money one would accept to violate HIPAA?

We address the research questions and make three contributions to the literature. First, we theorize the impact of a person's risk aversion level on the risk perception of getting caught if violating HIPAA. By doing so, we add to both of the risk aversion and criminology literature where the studies covering both risk preferences and criminal activity are scarce. Second, we conceptualize the relation between the HIPAA knowledge and the risk perception of getting caught if violating HIPAA. By doing so, we provide a new direction where we could examine the relation between knowledge and the risk perception of risky behavior in the context of criminology. Third, we empirically test the associations between the risk perception of violating HIPAA regulations and the amount of money one would accept to violate the law. In addition, we empirically test how does risk aversion correlate with gender and narcissism. These associations were widely examined in prior literature. However, the generalizability of the general findings has been challenged in various disciplines.

The paper is structured as follows. We first provide the theoretical foundations, followed by hypotheses development, methods, results and discussion.

Theoretical foundation and research model

Criminal theories

Most of the current research is focused on investigating the social and psychological causes of crimes (Harrington 1996; Hartel et al. 2010; Straub and Welke 1998; Wang et al. 2015). Some criminal theories provide insights on information security crimes. Becker (1968) adopted a rational choice perspective and argued that a criminal maximizes his/her expected benefits from a deviant behavior such that it would exceed the expected cost of crime. In IS field, general deterrence theory was firstly introduced among all criminal theories and it was used for exploring the effects of countermeasures and security policies on information (D'Arcy et al. 2009; Wang et al. 2015). Deterrence theory refers that one would deter criminal behavior when the expected loss (penalty of violating law) is larger than the expected gain. Deterrence theory focuses primarily on the effect of penalties (Willison and Warkentin 2013). Cohen and Felson (1979) stated that the crime can arise from changes in the structured situation or environmental setting and four elements - value, inertia, visibility, and access (VIVA)- would affect the suitability of a target of crime (Cohen and Felson 1979; Wang et al. 2015).

Risk aversion and risk perception

Risk aversion refers to one's preference of avoiding risk. The early introduction of risk aversion was based on expected utility theory, which stated that investors are risk-averse and they make the investment decision to maximize the wealth given the assumption that investors are rational (Tseng and Yang 2010; Von Neumann and Morgenstern 1947). Schoemaker (1993) stated that risk preference is a stable state across different individuals. The negative association between risk aversion and risky investment is widely explored and established in prior literature (Howcroft et al. 2003; Lee and Cho 2005). Ozanne et al. (2001) investigated the relation between moral hazed and the level of risk aversion, finding that the moral hazed and the effort for monitoring would decrease with the increasing of risk aversion. Despite the vast extant of studies applied risk aversion on decision making mechanism, there is limited literature addressing the relation between risk aversion and criminology.

Risk perception, on the other hand, refers to the subjective assessment of the probability of a specified type of negative event happening and how concerned the individuals are with the consequences (Sjöberg et al. 2004). Learning and understanding risk perceptions and the underlying processes is critical to know more about the way people think and respond to hazardous emergency events (Knuth et al. 2014). The current research is very important as it provides a new insight on how does risk aversion relate to risk perception of committing a crime, as well as explores the relation between risk aversion and risk perception in the context of criminology.

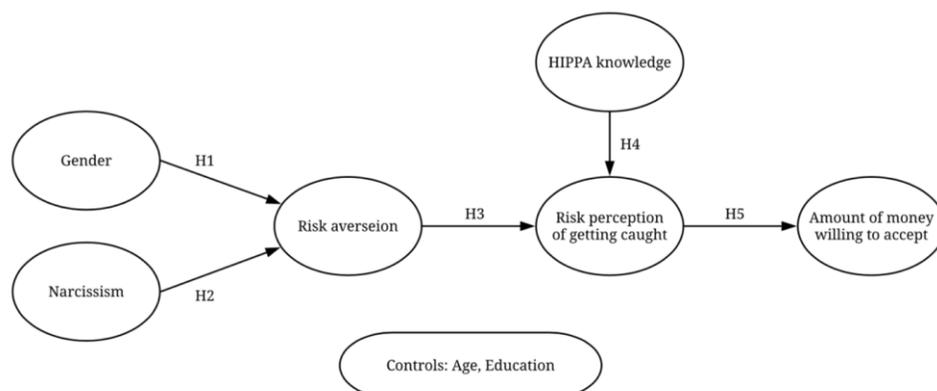


Figure 1. Research model

A wealth of finance and economics literature has studied the effect of difference gender on risk aversion (Borghans et al. 2009; Charness and Gneezy 2012; Jianakoplos and Bernasek 1998; Sapienza et al. 2009; Schubert et al. 1999). The mainstream research theoretically and empirically arguing that compared to males, females are more risk-averse (Borghans et al. 2009; Charness and Gneezy 2012; Jianakoplos and Bernasek 1998; Sapienza et al. 2009). Hence, we hypothesize that females are more risk-averse than males based on biological and societal explanations. First, Zuckerman (1994) showed that women produce higher levels of the enzyme monoamine oxidase than men, which inhibits sensation seeking and thus increase the extent of risk aversion (Watson and McNaughton 2007). Second, it was reported that females' resistance of taking part in risky behavior in later life may be explained by more restrictive parental monitoring during their childhood (Byrnes 2013). Flynn et al. (1994) suggested that some sociopolitical factors like power and status, which favor males, would also lead to their higher risk tolerance comparing to females (Watson and McNaughton 2007).

H1: Compared to males, females are more risk-averse.

The narcissistic personality, typically measured by the Narcissistic Personality Inventory (Raskin and Terry 1988), has been linked to elevated risk-taking behavior (Foster et al. 2009b), such as gambling (Lakey et al. 2008) and aggressive driving (Britt and Garrity 2006). Prior studies also indicated that a narcissistic CEO tend to take bold and risky financial actions or investment, and deliver extreme performance outcomes (Chatterjee and Hambrick 2011; Li and Tang 2010; Zhu and Chen 2015). Foster et al. (2009b) investigated the potential driving mechanisms of narcissism and risk aversion. According to approach and avoidance motivation theory (Davidson 1998; Gray and McNaughton 2003), the relationship between narcissism and strong approach/weak avoidance motivation has received consistent experimental evidences (Foster et al. 2009a; Foster and Trimm IV 2008). Narcissists would be less risk-averse due to their high sensitivity to potential rewards of risky behavior (Foster et al. 2009b).

H2: Narcissism is negatively associated with risk aversion, i.e., a narcissist is less risk-averse.

In the present study, we posit that individuals who are more risk-averse have higher perceived risk of getting caught if they violate HIPPA. Prior research suggested that risk propensity may impact risk perception (Brockhaus 1980; Vlek and Stallen 1980). People who have high risk propensity tend to be more risk-taking in a given situation. Conversely, risk-averse decision makers are more likely to focus on negative outcomes and pay less attention to positive outcomes (Keil et al. 2000). Violating law often results in negative outcomes. Individual decision makers would be affected by the negative outcomes and overestimate the probability of a loss (Schneider and Lopes 1986). This results in over-pessimism, which elevates the risk perception of decision makers (Keil et al. 2000), i.e. the perceived probability of getting caught in our setting.

H3: Risk aversion is positively associated with the risk perception of getting caught if violating HIPPA.

We argue that the HIPPA knowledge is related to the risk perception of getting caught in this setting. The more one would know about the law, the more he or she would be aware of the monetary and societal cost as the penalty of violating the law (Yoo 2018). In a study by surveying women who attended an infertility clinic, Grobman et al. (2001) stated that the knowledge of respondents about the risk of certain pregnancy complications affects their pregnancy-associated risk magnitudes. When participants were presented or educated with the knowledge of pregnancy-associated risk, they would perceive more risk of conducting deviant behavior. Several studies (Baldwin and Baldwin 1988; Bazargan et al. 2000) suggested that the HIV knowledge is significantly negatively related to HIV risk-taking behavior.

H4: HIPPA knowledge is positively associated with risk perception of getting caught if violating HIPPA.

The utility model is one of the major theories for the process of decision-making under risk (Fishburn 1970; Tversky and Kahneman 1981). A rational decision-maker, when faced with a choice, will prefer the option that offers the highest expected utility (Tversky and Kahneman 1981). In our setting, the perceived cost for violating HIPPA would be the possibility of getting caught and the punishment afterwards. On the other hand, the benefit would be the amount of money that one would receive if he or she violate HIPPA and disclose information. Therefore, according to utility theory and given the assumption that a rational

individual would end up with violating the law, he or she would expect higher amount of money if he or she has a higher perception of the risk violating HIPPA - the probability of getting caught.

H5: The risk perception of getting caught is positively associated with the amount of money that an individual willing to accept for violating HIPPA.

Methodology

Procedure

A full-scale survey was administered at a university in the northeastern United States. A pre-test was applied and then a pilot study was conducted to refine the instrument. Thirty-two executive MBA students and sixty-four internal medicine interns were part of the initial pilot study. Significant time was spent refining the instrument and to avoid the complexity involved in estimating probabilities and trade-offs found in many research studies involving scenarios and simulated games used to evaluate choice behavior. Finally, the survey was refined and distributed to 574 students in an advanced undergraduate information technology course in December of 2017. The number of students participating in the survey was 551, for a participation rate of 96%. We chose this undergraduate sample because they were more computer proficient, they will be entering the workforce in the immediate future and are less concerned with social desirability.

Measures

In this study, three constructs were operationalized using existing scales from previous studies and two are measured in scenario-based question. The items for risk aversion were adapted from Mandrik and Bao (2005). The items for narcissism for this study were adapted from part of the measure of grandiose narcissism (Foster et al. 2015). The items for evaluating HIPPA knowledge were generated from Annas (2003). The survey questionnaire consisted of items measuring the above three constructs and respondents scored each of these questions on a seven-point Likert-type scale. The risk perception and incentives were measured in scenario-based questions. Risk perception of getting caught in a HIPPA violation is measure by asking participants directly through a seven-point Likert-type scale. In addition, we measure the amount of money they are willing to accept to violate HIPPA with a categorical scale of money. Education and age were controlled in the model.

Reliability and validity

Cronbach Alpha values are all well larger than 0.80 and above the threshold value of point 0.70 (Gliem and Gliem 2003). The Convergent validity is assessed by calculating the average variance extracted (AVE) where each indicator is related to only one construct. The AVE values for all constructs exceeded 0.5, which is the desirable cutoff, suggesting a convergent validity (Fornell and Larcker 1981). Discriminant validity was established as the AVE values for any two constructs exceeded the squared construct inter-correlation for each pair (Fornell and Larcker 1981).

Common Method Variance

Common method variance (CMV) is a potential issue when the data is collected through a common method (Abdelhamid et al. 2017), in which the associations between the constructs are affected by the application of a single method (Podsakoff et al. 2003). Lindell and Whitney (2001) introduced marker variable technique to address CMV. A marker variable is a variable that is theoretically unrelated to one or more of the variables measured in the study (Lindell and Whitney 2001). We use "Fashion involvement" as a marker variable, which is theoretically unrelated to knowledge of HIPPA. The correlation between "Fashion involvement" and "knowledge of HIPPA" was 0.07 and not statistically significant, thus meeting the threshold of being below 0.1 (Lindell and Whitney 2001). Lastly, the estimation results of SEM (the level of significance and the direction of the correlation) did not change after controlling the marker variable in the model. Thus, there is no evidence that the data was biased due to CMV.

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Gender	0.60	0.49	1							
2. Age	20.92	1.49	0.041	1						
3. Education	2.17	1.01	-0.087*	0.249***	1					
4. Narcissism	3.79	1.17	-0.016	0.039	0.088	1				
5. HK ^a	5.22	1.00	-0.043	-0.028	0.003	0.033	1			
6. RA ^b	4.72	1.10	-0.236***	0.105*	0.011	0.178***	0.228***	1		
7. RPGC ^c	4.47	1.66	-0.205***	-0.036	-0.007	-0.109*	0.141**	0.173***	1	
8. AMWC ^d	8.90	2.99	-0.161***	-0.107*	-0.085*	-0.142**	0.201***	0.122**	0.438***	1

^aHK: HIPPA knowledge
^bRA: Risk aversion
^cRPGC: Perceived probability of getting caught
^dAMWA: Amount of money willing to accept

Table 1. Correlation table

Results

Stata 14.0 was used to recode and analyze the data. Estimates derived from the Structural Equation Modeling (SEM) are used to test the research hypotheses. Table 1 shows the correlation table. The results are presented Figure 2 and Table 2. The overall goodness of fit statistics of the structural model indicated a good model fit (RMSEA = 0.06, CFI = 0.91, TLI = 0.90 and SRMR = 0.07) (Abdelhamid et al. 2017; Hu and Bentler 1999).

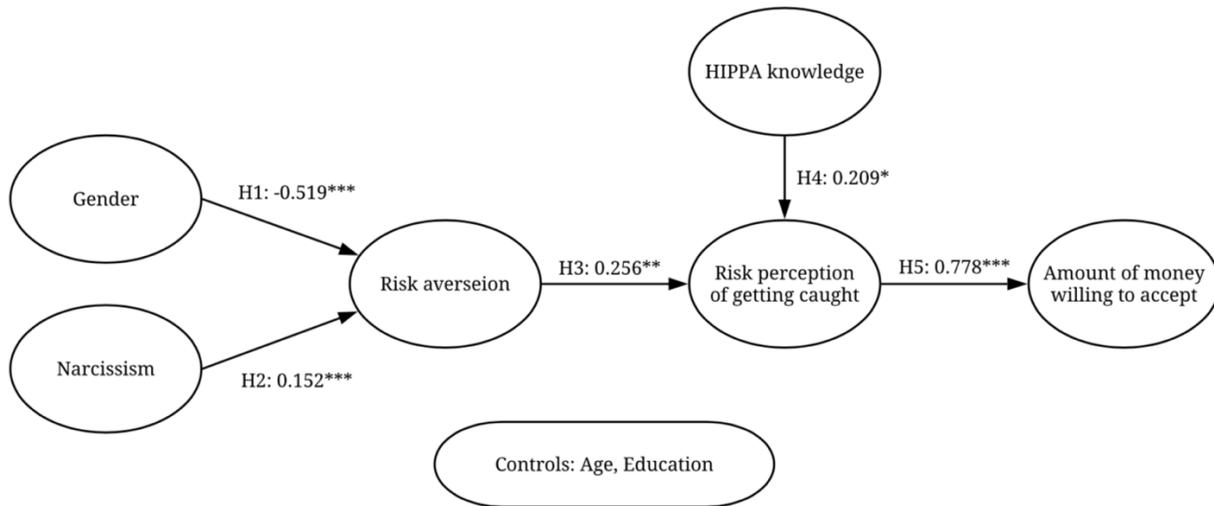


Figure 2. SEM results of research model

In the first hypothesis, we argue that females, compared to males, are more risk-averse. The path coefficient is negative (female is coded as 0, and male is coded as 1) and significant ($\beta = -0.519, P < .001$), which supports hypothesis 1. The second hypothesis states that narcissism is negatively associated with risk aversion. However, as opposed to the hypothesized negative effect, the path coefficient is positive and significant ($\beta = 0.152, P = .001$). In the third hypothesis, we propose that risk aversion is positively associated with the risk perception of getting caught if violating HIPPA. The path coefficient is positive and significant ($\beta = 0.256, P = .001$), which provides support to hypothesis 3. H4 hypothesizes that an individual who has more HIPPA knowledge would perceive more risk of getting caught if violating HIPPA. The results support the fourth hypothesis ($\beta = 0.209, P = 0.021$). In hypothesis 5, we hypothesize that the higher perceived probability of getting caught, the more amount of money an individual willing to accept for violating HIPPA. The path coefficient is positively significant ($\beta = 0.778, P < .001$), thus supporting hypothesis 5.

Path	Estimate	P value	95% CI
Gender --> RA ^a	-0.519	.000	-0.720 to -0.322
Narcissism --> RA	0.152	.001	0.032 to 0.220
RA --> RPGC ^b	0.256	.001	0.100 to 0.408
HK ^c --> RPGC	0.209	.021	0.031 to 0.387
RPGC --> AMWA ^d	0.778	.000	0.640 to 0.916
Controls			
Age	0.080	.015	0.017 to 0.146
Education	-0.040	.426	-0.142 to 0.053
Overall goodness of fit			
RMSEA ^e = 0.06			
CFI ^f = 0.91			
TLI ^g = 0.90			
SRMR ^h = 0.07			
^a RA: Risk aversion ^b RPGC: HIPPA knowledge ^c HK: Perceived probability of getting caught ^d AMWA: Amount of money willing to accept ^e RMSEA: root mean square error of approximation. ^f CFI: comparative fit index. ^g TLI: Tucker-Lewis index. ^h SRMR; standardized root mean square residual.			

Table 2: Model results

Discussion and future work

Our study makes three contributions to the criminology and information security literature. First, we theorize and test the influence of risk aversion on the risk perception of violating HIPPA as the outcome of interest. Our model and findings on the influence of risk aversion on risk perception of violating HIPPA addresses the gap in this literature which has scarcely addressed risk aversion in the context of criminology. We hypothesized that risk aversion is positively associated with the risk perception of getting caught if violating HIPPA and the result supported our hypothesis. The managerial implication of this finding for an organization is that managers could strengthen supervision by legally monitoring the employees who are less risk averse. Second, we conceptualize that HIPPA knowledge would have an impact on one’s risk aversion of violating HIPPA and accordingly, we hypothesize HIPPA knowledge is positively associated with risk perception of getting caught if violating HIPPA. Our results support our hypothesis and by this finding, we are able to fill the gap in the literature that prior studies seldom address the relation between the law knowledge and the risk perception if violating the law. In addition, the findings provide practical implications in encouraging healthcare organizations to actively and strategically educate their employee on HIPPA. Third, we empirically test the relation between the risk perception of violating HIPPA and the expected value if violating HIPPA, and as theorized, the result is in line with EU theory. In other words, people who perceived high risk of getting caught would only conduct information disclosure when higher amount of economic incentive is provided. In addition, we empirically test the relation between risk averse and gender/narcissism. The result indicates that females are more risk averse, which is concordant with prior literature. However, contrary to prediction of existing theories, our results show that narcissism is positively associated with risk aversion, which is an insightful finding.

We acknowledge the limitations of this study and identify opportunities for future research. First, although we capture a lot of variance among the variables using SEM estimation method, it would be interesting to

explore the impact of other variables on the entire model, such as ethics and justification, especially the association between the justification level and the amount of money one would accept to violate HIPPA. Second, we chose an undergraduate student sample on the basis that they are computer proficient and are less concerned with social desirability. However, this sample suffers from the generalizability issue. Future work may conduct a research in a healthcare organization to better test the model and understand the research question. Third, as indicated by our results, narcissism is positively associated with risk aversion, which is counter-intuitive to some extent. Future study may further explore the relationship between these two constructs theoretically and empirically.

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