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Three Research Essays on Propensity to Disclose Medical Information Through Formal and Social Information Technologies

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THREE RESEARCH ESSAYS ON PROPENSITY TO DISCLOSE MEDICAL INFORMATION THROUGH FORMAL AND SOCIAL INFORMATION TECHNOLOGIES

By

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ABSTRACT

THREE RESEARCH ESSAYS ON PROPENSITY TO DISCLOSE MEDICAL INFORMATION THROUGH FORMAL AND SOCIAL INFORMATION TECHNOLOGIES

by

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Under the Supervision of Dr. Derek Nazareth

This dissertation, which is comprised of three essays, examined disclosure propensity of healthcare providers from the US and Thailand and disclosure of personal health problems of healthcare consumers in social media context.

Essay 1: A Deterrence Approach in Medical Data Misuse among Healthcare Providers

Information and communication technology (ICT) have long been available for use in health care. With the potential to improve the quality, safety, and efficiency of health care, the diffusion of these technologies has steadily increased in the health care industry. With the adoption of electronic health records, personal electronics devices, internet connections and social network connections, comes the increased risk of medical data breaches. Due to the sensitivity of the information involved, and the existence of laws governing the use of this data, the responsibilities of a healthcare provider after a

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data breach remain a concern. Based on previous breach reports, institutional insiders were among the leading causes of medical data breaches. The causes were related to unawareness of institutional information security policies and system misuse. Thus it has become important to understand how to reduce such behaviors. Previous studies suggested deterrence theory that relies on security countermeasures can deter individuals' misuse behaviors by increasing the perceived threat of punishment. Thus our model posits that security countermeasures decrease medical data misuse through the two mediators; perceived certainty of sanctions and perceived severity of sanctions. This model was tested by 176 healthcare providers from different institutions across the US. The results suggested that perceived severity of sanctions has more effect in reducing medical data misuse than perceived certainty of sanctions. Hospital information security policies and HIPAA has stronger effect on perceived severity of sanctions than perceived certainty of sanctions whereas EHR monitoring and auditing has stronger effect on perceived certainty of sanctions than perceived severity of sanctions. Results of the study and implications for the research are discussed.

Essay 2: Propensity to Misuse Medical Data in an International Context – Deterrence and Cultural Values

As information abuse by healthcare providers is a problem that is faced around the globe, our study examined the effect of deterrence within two cultures; Asian and American (Thailand and the US). The reason to compare these two countries is because the foundation of the structures of the laws and the hospital policies for medical data

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protection of these two countries are similar. Thus others confounding factors are minimized. In terms of cultural influences, Hofstede's cultural dimensions that describe the effects of society's culture on the values to its members are considered as factors that can have an interaction effect with deterrence. Four Hofstede's cultural values were used; individualism-collectivism (IDV); uncertainty avoidance (UAI); power distance (PD); and long-term orientation (LTO). Also, social norms and morality were included. This study employed espoused values of Hofstede's cultural values, since all individuals from a country will not have identical values. In this study, we examined 1) the effect of espoused cultural values on deterrence, and 2) the effect of Hofstede's national cultural values on deterrence in two different healthcare cultures. Our model was tested by 613 healthcare providers; 437 from Thailand and 176 from the US. The results suggested that technical countermeasures had stronger effect on certainty and severity perception for both Thai and US cases, whereas procedural countermeasures had uncertain effect on sanctions perception for both cultures. The young generation of Thais was found more individualized and tended to have the same perception on sanctions as the Westerners. Social norms played an important role in reducing medical data misuse for Thai providers, whereas moral beliefs were more important for the US providers. Individuals who espoused different cultural values had different responses on medical data misuse. Results of the study and implications for the research are discussed.

Essay 3: Intention to self-disclose personal health information in social media context

    In recent years social media is quickly becoming a large part of people's everyday lives. With the availability of smartphones and tablets, coupled with a slew of apps for

these devices, people now have ubiquitous access to social media. Virtual social media application encourages people to meet, and share information. Health problems represent one aspect that is shared in a social media context. Benefits and risks of self-disclosure are two main factors that determine social media users' intention to share their sensitive information on social network. This paper integrates social exchange theory, a theory that focuses on gains and losses of building a relationship, and the social penetration theory, a theory that explains human's self-disclosure, to construct the model for investigating self-disclosure intention on personal health problems of social medial users. In addition, we included factors that affect self-disclosure intention including ease of use of social media, social influence, and nature of health problems.

Through an online survey, we examined factors that determine self-posting in social media account with 374 social media users across the US. The results suggested that individual and social benefits of self- disclosure outweighed the risks and have significant effect on self-disclosure intention on personal health problems. The individual risks and social risks had little negative effect on self-posting about health problems. In addition, social influence, and social networking experiences were factors that encouraged social media users to reveal their personal health problems.

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LIST OF ABBREVATIONS

The following table describes the significance of various abbreviations and acronyms used throughout the thesis.

Abbreviation	Meaning
R^2	R-Squared or Coefficient of Determination
χ^2	Chi-Square Test
AGFI	Adjusted Goodness-of-Fit Index
AHIA	Association of Healthcare Internal Auditors
AHIMA	American Health Information Management Association
AMOS	Analysis of Moment Structures
AT	Acceptance
AVE	Average Variance Extracted
B.E.	Buddhist Era
BYOD	Bring Your Own Device Program
CD	Communication in Depth
CDC	Center for Disease Control and Prevention
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CLF	Common latent factor
CMB	Common Method Bias
CR	Composite Reliability DF Degree of Freedom
DOJ	Department of Justice
EB	Emotional Benefit
EFA	Exploratory Factor Analysis
EHRs	Electronic Health Records
EMRs	Electronic Medical Records
ER	Emergency Department
EU	Ease of Use GDT General Deterrence Theory
GFI	Goodness-of-Fit Index
GINA	Genetic Information Nondiscrimination Act
HCCA	Health Care Compliance Association
HHS	Department of Health and Human Services
HIPAA	Health Insurance Portability and Accountability Act
HITECH	Health Information Technology for Economic and Clinical Health Act

Abbreviation	Meaning
HP	Health Information Privacy Concern
IB	Individual Benefits of Personal Health Problems Disclosure
ICT	Information and Communication Technology
IDV	Individualism-Collectivism
IFI	Incremental Fit Index or DELTA2
INT	Medical Data Misuse (Essay1-2) or Self Disclosure (Essay3)Propensity
IP	Personal Information Privacy
IR	Individual Risks of Personal Health Problems Disclosure
IS	Information Security
IT	Information Technology
LTO	Long Term Orientation
MB	Moral Beliefs
MC	Social Media Privacy Control
ML	Maximal Likelihood
MT	Mistrust in Social Network Sites
NAMCS	National Ambulatory Medical Care Mail Survey
NFI	Normed Fit Index or Bentler-Bonett Normed Fit Index or DELTA1
NH	Nature of Health Problems
NLC	National Learning Consortium
PC	Perceived Certainty of Sanctions
PCM	Procedural Countermeasures
PD	Power Distance
PF	Positive Feedback
PHI	Protected Health Information
PS	Perceived Severity of Sanctions
RE	Reassurance
RMSEA	Root Mean Square Error of Approximation
SB	Social Benefits of Personal Health Problems Disclosure
SC	Social Criticism
SD	Standard Deviation
SEM	Structural Equation Model
SET	Social Exchange Theory
SETA	Security Education, Training and Awareness
SI	Social Influence
SN	Social Norms
SO	Social Ostracism
SP	Social Privacy Risk
SPSS	Statistical Package for the Social Sciences

Abbreviations	Meaning
SPT	Social Penetration Theory
SR	Social Risks of Personal Health Problems Disclosure
SRMR	Standardized Root Mean Square Residual
SU	Self Understanding
TAM	Technology Acceptance Model
TCM	Technical Countermeasures
TLI	Tucker-Lewis Index or Non-Normed fit index
UAI	Uncertainty Avoidance

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CHAPTER 1

INTRODUCTION

The use of health information technology, particularly at the point of care, has been shown to improve care, coordination, and quality of health care. Electronic Medical Records (EMRs) or Electronic Health Records (EHRs) represents a technology that healthcare organizations have increasingly adopted in an effort to increase effectiveness and efficacy of healthcare services. A survey conducted in 2012 by the National Ambulatory Medical Care (NAMCS) showed that about 72% of office-based physicians used EMR/EHR, representing a 26% increase from the previous year. This is in part prompted by the enacting of The Affordable Health Care Act that has mandated the use of EMR/EHR by 2021(Hsiao & Hing 2012). The benefits of using EMR/EHR are clear – namely in the form of increased access to reliable and up-to-date patient data. These benefits are experienced by multiple stakeholders, including the patient, the primary care physician, as well as the organizations that serve the patient. Some concerns about EMR/EHR adoption include the cost of introduction and operation, productivity dips while providers initially learn the system, and process losses associated with data collection and entry, particularly with providers that are used to dictating.

Other concerns with EMR/EHR include the potential for security and privacy breaches of medical data, facilitated by the easy access to large volumes of patient data – something that would be far less likely in the case of paper-based medical records. Breaches of patient medical data are required to be reported to the Department of Health & Human Services. The breach report for the year 2013 tallied approximately 200

incidents involving over 7 million patient records. The forms of medical data breaches varied widely which included 45% from theft of personal devices, 22% from unauthorized access, 10% from loss of personal devices, and 6% from hackings of hospital systems (Redspin 2013). Thus the incidents of breaches significantly associate with EMR/EHR use.

While most of these breaches involve external agents, there is always the possibility that PHI may be inappropriately accessed, scrutinized, and transmitted by employees. These would constitute HIPAA violations, but in all likelihood, will not be reported since institutions are not always aware of their occurrence unless comprehensive audit trails are incorporated as part of routine practice. The use of other personal technologies may exacerbate this situation. In the SANS report on October 2013 Inaugural Health Care Survey (sponsored by Redspin), a study conducted at a hospital starting its "Bring Your Own Device" program. The program encourages employees to use their own devices to connect with the hospital EHRs, thereby opening up the organization to HIPAA violations in case of device loss or theft. A number of additional forms of medical data breaches have been reported. These concerns included 83% from lost or stolen mobile devices, 37% from lack of employee security awareness about mobile use policies, 73 % from insecure or unprotected endpoints, 67% from corrupt or malicious applications e.g. mobile malware, 48% from insecure Wi-Fi use and 46% from insecure web browsing (Redspin 2013).

Furthermore, in a technology-centered world, it is likely that convenience may often trump legality, e.g. downloading to personal devices, and sharing information online which may facilitate individual performance, but may be of dubious legality.

Reports about online patient health information breaches are beginning to surface, all around the world. More investigation about breaches that related to personal devices use of health care providers and sharing medical data online for patients care purpose is needed.

Although there are concerns about insiders and breaches of PHI, to our knowledge, there is no study that examines healthcare providers' intention regarding medical data misuse which could help a health policy maker, a medical and nursing training institution, or hospital executives answer these concerns. This research comprises three related studies about medical information misuse and disclosure. In the first study, we examine healthcare providers including physicians, registered nurses, medical students, and nursing students' attitude regarding these concerns. We apply deterrence theory, which has previously been used to examine employees' intentions about information system misuse. Deterrence theory has also been used to examine information misuse in financial organizations. We assume that medical data, which contains sensitive information of patients, should be protected, and not subject to misuse by healthcare providers.

As health information security is a universal problem, examining this problem in a different part of the world will shed the light on how cultural values influence healthcare providers' decision regarding medical data misuse. In our second study, we examine the propensity to misuse medical data by healthcare providers from two different cultures. When comparing the two cultures, several confounding factors may interfere with results' interpretation. In order to minimize this problem, countries that have similar health information security acts and policies are selected. In this study, we selected

Thailand and the US since they employ similar fundamental policies governing private medical data.

To examine the cultural influence on healthcare providers, we employ Hofstede's cultural values and examine the interaction of cultural dimensions on the relationship between deterrence and medical data misuse propensity. In order to adequately explain differences between the two contexts, we included social norms and moral beliefs in the study as these two factors influence employees' attitude on information security. We also examine the interaction between Hofstede's cultural values on a relationship between social norms and moral belief on medical data misuse propensity.

Cultural values can have effect on people at a group level as cultural influence, and at an individual level as individually espoused values. In our second study, we examine both levels of cultural values.

In our third study, in order to see the complete picture of medical data revelation, we examine health consumers' side about self-revelation of personal health information. We elect to examine health consumers who currently use social media because it presents an individual the opportunity to reveal their personal information in a controlled and presumably supportive environment. Recently, it is becoming more common to see social network users post their private information and photos in forums that permit sharing with their friends, related groups, and the public. We apply social exchange theory and social penetration theory in this study since it provides a mechanism for users to assess the relative risks and benefits at the individual and social level when deciding to post to the network. Therefore, we assume that self-revelation of health problems in social media

accounts should be based on these two theories as well as other revelation of personal information. Social exchange theory posits that human relationships are formed based on costs and benefits of reciprocal interaction among people. Social penetration theory explains the process of self-disclosure. To sum up, these theories contend that an individual will gradually reveal his/her private information if he/she sees benefits of revealing are more than risks.

Beside the risks and benefits of self-posting, we added three more factors that could determine self-disclosure - ease of use of social network, social influence, and nature of health problems in our model. These three factors have been previously used in related studies on people's intention to self-disclose personal health problems.

An overview of the three essays is presented in the table below.

Essay	Base Theories	Dependent Variable	Independent Variables	Moderating Variables
Essay 1	Deterrence	Medical data misuse propensity	Technical measures Procedural measures Sanctions	–
Essay2	Deterrence Cultural values	Medical data misuse propensity	Technical measures Procedural measures Sanctions Moral belief Social norms	Espoused culture
Essay 3	Social exchange Social penetration	Self-disclosure propensity	Benefits Risks Disclosure media Medical condition	–

Table 1.1   Overview of Three Essays

The remainder of the dissertation is organized as follows. In chapters 2, 3 and 4, we provide the motivation, theoretical foundation, literature review, research model, hypotheses, methods, and data analysis, summaries, and discussion about implications for

research and practice for each of the three studies. Chapter 5 ties up the findings across the three essays.

CHAPTER 2

ESSAY 1:   A DETERRENCE APPROACH TO MEDICAL DATA MISUSE AMONG HEALTHCARE PROVIDERS

2.1 INTRODUCTION

The use of health information technology, particularly at the point of care, has been shown to improve care, coordination, and quality of health care. Electronic Medical Records (EMRs) and Electronic Health Records (EHRs) represents a technology that healthcare organizations have increasingly adopting in an effort to increase effectiveness and efficacy of healthcare services (Hsiao et al 2012). A survey in 2012 by the National Ambulatory Medical Care (NAMCS) showed that about 72% of office-based physicians used EMR/EHR, representing a 26% increase from previous year. This is in part prompted by the enacting of the Affordable Health Care Act that has mandated the use of EMR/EHR by 2015 The benefits of using EMR/EHR are clear – namely in the form of increased access to reliable and up-to-date patient data, for multiple stakeholders, including the patient, the primary care physician, as well as the organizations that serve the patient. Some concerns about EMR/EHR adoption include cost of introduction and operation, productivity dips while providers initially learn the system, and process losses associated with data collection and entry, particularly with providers that are used to dictating.

Other concerns include the potential for security and privacy breaches of protected health information (PHI), facilitated by the ready access to large volumes of

patient data – something that would be far less likely in the case of paper-based medical records. Breaches of patient medical data are required to be reported to the Department of Health & Human Services. The breach report for the year 2013 (Redspin 2013) tallied approximately 200 incidents involving over 7 million patient records. The forms of medical data breaches varied widely, including 45% from theft of personal devices, 22% from unauthorized access, 10% from loss of personal devices, and 6% from hackings of hospital systems.

While most of these breaches involve external agents, there is always the possibility that PHI may be inappropriately accessed, scrutinized, and transmitted by employees. These would constitute HIPAA violations, but in all likelihood, will not be reported, since institutions are not always aware of their occurrence, unless comprehensive audit trails are incorporated as part of routine practice. The use of other personal technologies may exacerbate this situation. In a study at a hospital starting its "Bring Your Own Device" program (Redspin 2013) that encouraged employees to use their own devices to connect with the hospital EHRs, a number of additional forms of medical data breaches were reported. These included 83% from lost or stolen mobile devices, 37% from lack of employee security awareness about mobile use policies, 73 % from insecure or unprotected endpoints, 67% from corrupt or malicious applications e.g. mobile malware, 48% from insecure Wi-Fi use and 46% from insecure web browsing.

Furthermore, in a technology-centered world, it is likely that convenience may often trump legality, e.g. downloading to personal devices, sharing information online, may facilitate individual performance, but may be of dubious legality. Reports about online patient health information breaches are beginning to surface, all around the world.

A report in The Straits Times (Teng 2013) in Singapore described an incident where a medical student was suspended after tweeting patient health information. Another report from Posttoday (2013) described how a hospital was sued because a nurse posted a photo while working in the Emergency Department (ER) which included a patient's face in the background.

Congress passed HIPAA (Health Insurance Portability and Accountability Act of 1996) in order to protect patient's health information. It establishes national standards for protecting the privacy and security of health information and defines specific rights for individuals with respect to their health information. All health care providers are required to comply with it. Individually identifiable health information that is created or received by a covered entity qualifies as protected health information is subject to rules and regulations outlined in HIPAA. Since the passage of HIPAA, health care organizations nation-wide have to organize, develop and demonstrate its information security policy and management system on the basis of this regulation. As part of the American Recoveries and Reinvestment Act of 2009 18long the same lines, Congress also passed the Health Information Technology for Economic and Clinical Health Act (HITECH). HITECH makes several modifications to HIPAA including; creating incentives for developing meaningful use of electronic health records, changing the liability and responsibilities of business associates, redefining what a breach is, creating strict notification standards, tightening enforcement, raising the penalties for a violation, and creating new code and transaction sets (HIPAA 1996, HITECT 2009). Although HIPAA regulations are fairly rigorous, on a practical basis, if healthcare employees are not aware of the regulations, health information breaches are likely to occur. This

behavior is reflected in 4 years of Redspin12 showing that breaches remained unchanged and 90% of them were due to internal misuse.

Although statistics indicating breaches due to internal misuse are plentiful, studies that examine the motivation and curbing of these problems are few. This study is part of a larger set of studies to examine misuse behavior by healthcare providers, and possible solutions to the problem.

The numbers of PHI breaches that involve internal misuse of hospital security resources highlight the importance of understanding how institutions can reduce these behaviors. Previous studies (Blumstein 1978, Straub 1990, Straub & Nance 1990, Straub& Walke 1998, Nagin & Pogarsky 2001, D'Arcy et al 2009, Hovac & D'Arcy 2012) suggested using general deterrence theory can help researchers and healthcare executives understand employees misuse behaviors. In general deterrence theory, perceived certainty and severity of sanctions can serve as deterrents to violations of information security. This study will introduce and test a deterrence model that posits that medical data misuse by healthcare providers will be reduced through security countermeasures that directly impacts healthcare providers' perception of the certainty and severity of sanctions and thus, the perception of sanctions have the impacts on medical data misuse. The results advance understating whether current security countermeasures have influence on perception of sanctions and reduce healthcare providers' misuse. Also, the results have important implications for the practice of information security management in healthcare settings.

2.2 THEORETICAL BACKGROUND

In this section, we review deterrence theory that we used to develop the theoretical model and hypotheses and review healthcare security countermeasures.

2.2.1 Deterrence Theory

Deterrence is the use of punishment as a threat to deter people from offending. This theory is rooted in criminology. Three early philosophers who helped develop key ideas in modern criminological deterrence theory are Hobbes (Hobbes 1950), Beccaria (Beccaria 1963), and Bentham (Bentham 1948). Their theory relies on three individual components: severity, certainty, and celerity (swiftness). They believe that the highly enough severity of punishment, the certainty of punishment and the swiftness of punishment after committing crimes will make people consider benefits and costs before committing crimes. Classical philosophers thought that certainty is more effective in preventing crimes than the severity of punishment (Beccaria 1963, Bentham 1948). However, for celerity, a recent study by Nagin (2001) found that the effect of celerity was unclear on the intention to commit a crime. He suggested that celerity should be either include as a part of severity or certainty of sanctions rather than being evaluated separately or should be ignored. Therefore because of the unclear effect in our study, we did not include celerity in our model.

The concept of deterrence has two key assumptions and falls into three categories. The first assumption is specific punishments that offenders received will deter or prevent them from committing further crimes. The second assumption is the fear of punishment will prevent others from committing the same crimes (Summerfield 2006). The three

distinct categories are: General Deterrence or indirect deterrence, Specific Deterrence, and Marginal Deterrence (Bedau 1983, Kleck 1988, Shavel 1992). General deterrence focuses on prevention of crime by making examples of specific offenders. The individual who receives the punishment is not the focus of the attempt of behavioral change, but the punishment he or she receives is conveyed to public in the belief that it will deter other individuals from committing the same crimes in the future (Kleck 1988). Specific deterrence, on the other hand, focuses on a criminal. The aim of the punishment is to discourage the criminal from committing future crimes by instilling an understanding of the consequence. The punishment that a criminal receives will convince him or her not to repeat further illegal acts (Siegel 2005). Marginal deterrence adopts more of a sliding scale concept, and dictates that the severity of the punishment should depend on the severity of the crime, as well as the frequency of the crime. In other words, a criminal who commits severe crime or commit several crimes should receive harsher punishment. Marginal deterrence is intended to deter criminals from recidivism (Siegel 2005).

In terms of implication to institutional strategies for reducing information security misuse, general deterrence theory has been applied successfully to the information security (IS) environment by Straub and his research partners (Straub, 1990, Straub & Nance 1990, Straub & Welke 1998). The basic argument in this work is that information security actions can deter potential computer abusers from committing acts that implicitly or explicitly violate organizational policy. Building on the model of deterring IS misuse, it was found that IS misuse can be curbed with a combination of procedural and technical controls (D'Arcy et al. 2009) including security policy and guideline, security awareness program and computer monitoring. Straub et al (1998) termed these controls as "deterrent

countermeasure". Procedural countermeasures and technical countermeasures are two main forms of deterrence countermeasures (Hovav & D'Arcy 2012). Procedural countermeasures include information security policies, guidelines and training programs. Technical countermeasures include security monitoring and auditing programs (Hovav & D'Arcy 2012).

Information security policies and guidelines contain detailed guidelines for the proper and improper use of IS resources (Whitman et al. 2001). Employees are required to comply with security policies, and provide acknowledgement of IS misuse to increase the employees' awareness of the punishments of misuse behaviors (Lee & Lee 2002). Security awareness program, on the other hand, represent sessions that convey knowledge about risks in the organizational environment, emphasize actions taken by the firm including policies and sanctions for violations, and reveal threats to local systems and their vulnerability to attack (Straub et al. 1998). Effective security awareness training stresses the two central tenets of general deterrence theory which are certainty of sanctions and severity of sanctions (Blumstein 1978).

Technical countermeasures include computer monitoring, password access control, all access login history, all access monitoring, misuse detection and system audit (Straub et al. 1998). These surveillance activities deter IS misuse by increasing the perceived chances of detection and punishment for misuse (Straub & Nance 1990).

Despite the strong empirical support in predicting illicit behavior in criminology, deterrence theory has received mixed support in the IS security among empirical studies. Hollinger and Clark (1983) studied the deterrence with employee thief with 9,175

employees from different sectors (i.e., retail organizations, hospitals, and manufacturing plants). Their study found that the perception of both the certainty and severity of organizational sanctions had negative association to employee theft. Straub (1990) applied general deterrence in his study that investigated the direct effects of deterrence certainty and deterrence severity, as represented by security efforts, dissemination of information about penalties, and guidelines for acceptable system use and policies for computer misuse with 1,211 IS personnel. The study found that security countermeasures that include deterrent administrative procedures and preventive security software will result in lower computer abuse, thereby supporting the basic tenets of deterrence theory. A study by Skinner & Fream (1997) investigated the relationship of social learning including imitation, association, and deterrence on intention to commit computer crime. The study involved 581 undergraduate students and found that perceived severity of sanctions had a significant negative effect on computer crime behaviors. Interestingly, the study found that perceived certainty of sanctions did not have a significant effect on computer crime. Another study by D'Arcy et al (2009) investigated the relationship of security policies, education and training, and computer monitoring on IS misuse intention. It used perceived certainty and severity of sanctions as mediators, and was conducted using 269 computer-user employees. The study found that perceived severity of sanctions is more effective in reducing IS misuse than certainty of sanctions. On the other hand, a study by Herath & Rao (2009) that examined the direct relationship between penalties including perceived certainty and perceived severity of penalties on policy compliance intention. It used 312 employees and found that certainty of detection was positively significant on policy compliance intention while severity of punishment

was found to have negative effect on policy compliance intention. The inconsistency results of deterrence theory in the IS misuse was reviewed by D'Arcy & Herath (2011) and they proposed that 5 additional factors be considered in future further research involving deterrence theory in IS misuse. These include self-control, computer self-efficacy, moral beliefs, degree of work that an employee performs from dispersed locations e.g. remote work, office work, and employee position. However, a robust theoretical foundation for their inclusion is not provided.

2.3 APPLICATION TO THE HEALTHCARE CONTEXT

To our knowledge, there is no study that uses deterrence theory to examine healthcare providers' IS misuse behavior. This is despite the facts that this theory is a basic theory for studying misuses and has long been used to study IS misuse in business and finance organizations. The extended general deterrence model used in this study is based on that of D'Arcy et al (2009). In the model, we used healthcare information security countermeasures as antecedents, perceived certainty and severity of sanctions as mediators, and medical data misuse as a consequence.

2.3.1 Healthcare Countermeasures

In recent years, the US healthcare industry has undergone revolutionary changes, driven by advances in IT and legislation. The legislation involved with these changes includes the Health Maintenance Organizations Act of 1973, the landmark Health Insurance Portability and Accountability Act (HIPAA) of 1996, Health Information Technology for Economic and Clinical Health Act (HITECH), in part of the American

Recoveries and Reinvestment Act of 2009 and HIPAA omnibus rules 2013. As HIPAA and HITECH are the main legislation emphasizing information security, in this study only these two acts are reviewed.

HIPAA is a federal law that establishes national standards for protecting the privacy and security of health information and defines specific rights for individuals with respect to their health information. HIPAA requires that all covered entities including healthcare sectors and business associates to ensure implementation of administrative safeguards in the form of policies, and personnel, physical safeguards to their information infrastructure, and technical safeguards to monitor and control intra and inter-organizational information access in their settings. HIPAA requires each institution to provide training for its employees, volunteers, and others in the organization. The training is to be completed prior to or soon after entering work at the healthcare institutions. HIPAA offers flexibility to the institutions to tailor their own training. The training can be adjusted according to employee jobs' functions, and employees' statuses (new employees vs. current employees). Also, the training schedules, including frequency, duration, number of classes, and delivery mode can be adjusted according to employee and institutional needs. HIPAA indicates that the training modules should address vulnerabilities of electronic health information, how to protect the information, password maintenance, incident reporting, viruses and malicious codes awareness, and institutional privacy policy. Also, HIPAA defines the criminal penalties and civil penalties for individuals and organizations that violate the legislation. HIPAA defines in its legislation that those who fail to comply with HIPAA can receive civil and criminal penalties (42 USC § 1320d-5). The civil penalty includes the fine that is determined by

the Department of Health and Human Services (HHS). Each case will be scrutinized based on the nature and harm that results from the violation. The amount of fine per case can vary from $100 to $1.5 million. The criminal penalty is clarified by the U.S. Department of Justice (DOJ). The minimal penalty is a fine up to$50,000 and imprisonment for up to 1 year, while the maximum penalty is a fine up to $250,000 and imprisonment for up to 10 years.

Congress also passed the Health Information Technology for Economic and Clinical Health Act (HITECH) as part of the American Recoveries and Reinvestment Act of 2009. It adds several stipulations to HIPAA such as creating incentives for developing meaningful use of electronic health records, changing the liability and responsibilities of business associates, redefining what a breach is, creating strict notification standards, tightening enforcement, and raising the penalties for a violation.

Recently the Department of Health and Human Service (HHS) institutes modifications to the HIPAA Privacy, Enforcement, and Breach Notification Rules under the Health Information Technology for Economic and Clinical Health (HITECH) Act and the Genetic Information Nondiscrimination Act (GINA). The four omnibus that enacted on March 2013 involved (HPAA Omnibus Rule 2013, Leyva C. 2013): 1) Modifications to the HIPAA Privacy, Security, and Enforcement Rules mandated by the Health Information Technology for Economic and Clinical Health (HITECH) Act, including1.1) Business associated bodies are liable for compliance with HIPAA privacy and security requirement,1.2) Strengthening of the limitations on the use and disclosure of protected health information for marketing and fundraising purposes, and prohibition of the sale of protected health information without individual authorization,1.3) Privacy practice

notification by covered entities,1.4) Individual authorization and requirements to disclose proof of child immunization to schools and to decedent information by family members or others, and 1.5) Enforcement of noncompliance with HIPAA rules due to willful neglect; 2) Increased and tiered civil monetary penalty structure provided by the HITECH Act; 3) Breach notification for unsecured protected health information under the HITECH Act and; 4) Proscription of health plans from using or disclosing genetic information for underwriting purposes.

In addition, the Department of Health and Human Services (HHS) states that each covered entity is required to create and utilize the appropriate sanctions against employees who violate policies and procedures. The department recommends entities coordinate and review policies, procedures and sanctions with top level healthcare employees and legal representatives to ensure accuracy, comprehensiveness and legality.

2.3.2 Providers' Perspective of Compliance

HIPAA compliance has been criticized about its lack of clarity (Apari and Johnson 2010). A study by Warkentin et al. (2006) measured compliance attitudes among administrative staffs and medical staff in healthcare facilities in the public and private sectors, and found that that public hospitals were more likely to foster compliance attitudes (i.e., belief in their capability to safeguard and protect patient's information privacy) than private facilities. Further, administrative staff members were generally more likely than medical staff members to have attitudes favoring compliance. Even though most healthcare institutions have policies in place, and have conducted training of their employees, there is a disconnect with most administrative staff indicating compliance, while practice level staff exhibit a lack of confidence whether they are

properly complying with privacy and security requirements. As a result, this study focuses on healthcare practitioners and not administrators.

2.4 RESEARCH MODEL, CONSTRUCTS, AND RESEARCH HYPOTHESES

General deterrence theory forms the basis for the research model in this study. The dependent variable of interest is medical data misuse propensity. The independent variables are procedural countermeasures and technical countermeasures. Procedural countermeasures include HIPAA knowledge, hospital information security and privacy policies, and HIPAA training. Technical countermeasures include monitoring and auditing of Electronic Health Records (EHR) usage. Specific deterrence constructs employed in this study are perceived certainty of sanctions and perceived severity of sanctions. These act as mediators between procedural and technical countermeasures on medical data misuse propensity, and are based on prior studies involving deterrence theory and IS misuse(D'Arcy et al 2009, Hovav & D'Arcy 2012).

The research model employed in this study is illustrated in Figure 2.1. It suggests that procedural countermeasures and technical countermeasures have a direct impact on perceived certainty of sanctions and perceived severity of sanctions. These in turn have a direct effect on the medical data misuse propensity, and serve as mediator variables with the procedural and technical countermeasures. This study does not include direct effect of the procedural and technical countermeasures on medical data misuse propensity. The unit of analysis for this study is an employee at healthcare institutions, and includes physicians, registered nurses, medical students and nursing students.

Figure 2.1: The Extended GDT Model and Hypotheses
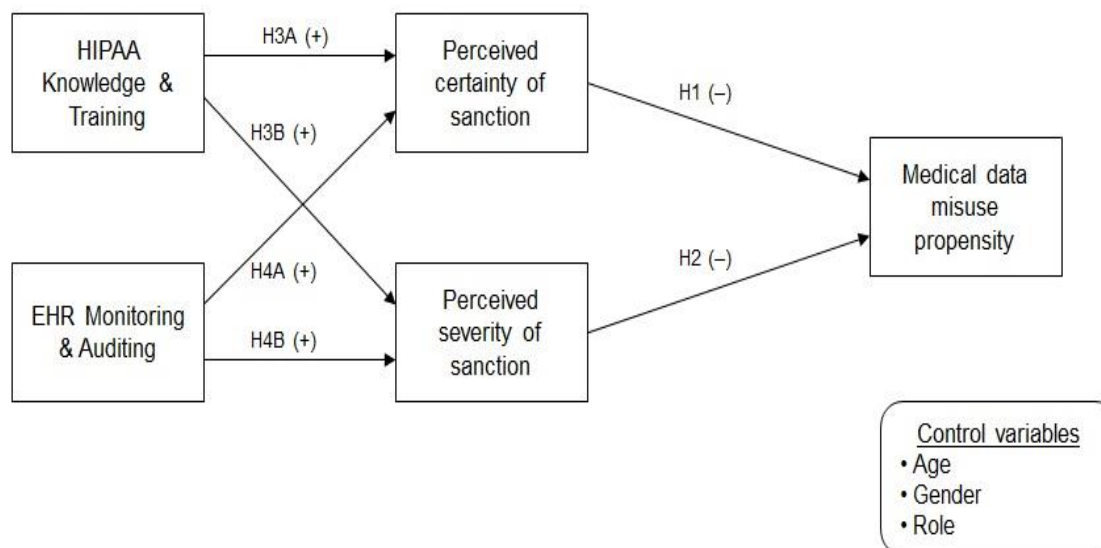
2.4.1 Medical Data Misuse Propensity

This term is defined as an individual's propensity to engage in intentional and unintentional behaviors that violate the institution privacy and security policy and/or HIPAA compliance. The domain of medical data misuse is quite varied, ranging from behaviors that are unethical and/or inappropriate (e.g. personal use of smartphone to take a copy of patient health records) and to those that are illegal (e.g. selling patient medical data to an insurance company). In this study, we intend to examine a range of medical data misuse propensity in various contexts by introduction of several scenarios embodying misuse. However, we focus the scenarios on common situations that are plausible, rather than address pathological and esoteric cases. Our intention is to measure motivation state just prior to committing an act. We did not view an actual behavior.

2.4.2 Perceived Certainty and Severity of Sanctions

Within the deterrence model, it is believed that if the individual perceives that sanctions will be certainly applied, and that they will be severe, then they are less likely to engage in behavior that merits such sanctions (Bedau 1983, Kleck 1988, Shavell 1992, Seigel 2005). According to Title (1980), the certainty of the sanctions refers to the tendency of being punished, while the severity of sanctions addresses the degree of punishment that is meted out as a consequence of unacceptable behavior. In deterrence research, it is shown that fear of sanctions is negatively associated with the intention to engage in unacceptable behaviors, in the social context as well as the workplace (Title 1980, Hollinger &Clark 1983, Straub 1990, Nagin & Pogarsky 2001, D'Arcy et al 2009, Herath &Rao 2009). For healthcare organization, HIPAA requires that all covered entities must comply with HIPAA and conducts trainings and have institutional policies accordingly. HIPAA also defines that the non-compliance to HIPAA results in fines either institutions or individual penalties of up to 10 years in prison as the maximum sentence., All healthcare employees are supposed to be trained and knowledgeable about HIPAA and hospital policy, and should therefore be able to while are being able to predict consequences in the form of punishments regarding medical data misuse. Therefore, we propose the following hypotheses.

Hypothesis 1 (H1): Perceived certainty of sanctions is negatively associated with medical data misuse propensity.

Hypothesis 2 (H2) Perceived severity of sanctions is negatively associated with medical data misuse propensity.

2.4.3 Procedural Countermeasures

Procedural countermeasures comprise two aspects, institutional information security policy, and HIPAA training. Both play an important part in generating awareness and knowledge about the need to protect medical data.

An organization's security policy seeks to achieve goals regarding information security in that organization (Gaston 1996). The policy defines the rules and guidelines for the proper use of organization IS resources (D'Arcy 2009 et al). Healthcare institutions are required to comply with HIPAA so that the institutional privacy and security policy must reflect HIPAA legislation. The National Learning Consortium (NLC) provides a template for developing institutional security polices and training that is compliant with HIPAA and HITECH Acts (Health Information Technology Research 2011). It suggests that institutional policies and training must cover several aspects, including scope and purpose of the policy; employee responsibilities including requirements, prohibited activities, electronic communication, report security incidents, internet usage, the use of medical data; network connectivity; disposal of media; audit control; sanction policy; security awareness and training; and breach notification. Clearly each institution needs to assemble a policy that is HIPAA and HITECH-compliant. Also they need to document the nature of data that they collect, information about the individuals who work with and request that data.

In the deterrence context, a security policy is considered equivalent to the organization's laws (D'Arcy et al 2009), and should spell out the sanctions when the law is broken. An employee's responsibilities need to be described, and the sanctions or

penalties that will be applied when an employee does not comply with the policy need to be formulated. The organization's security policy can be the basis for litigation or internal measures of IS misuse behaviors (Straub and Nance 1990), and should heighten perceived certainty and severity of sanctions. The absence of any security policy can lead to misunderstanding about acceptable and unacceptable behavior and lead users to assume that IS misuse is not subject to enforcement (Straub 1990).

HIPAA requires a covered entity to conduct training for its employees. HIPAA Section 164.530 states that a covered entity must train all employees of its workforce on the policies and procedures with respect to medical data required by their job description, as necessary and appropriate for the members of the workforce to carry out their functions. The training should be conducted for each member no later than the compliance date, and for each new member within a reasonable period of time. In addition, when there are material changes to the policy, then all members must be retrained within a reasonable time frame. Furthermore, HIPPA requires all covered entities to provide ongoing updates and document evidence of compliance in written or electronic form and retain it for a minimum of six years from the implementation date. HIPAA contains four training levels. Each level is tailored for specific jobs of the employees.

Research has found that training programs that includes acceptable behaviors, unacceptable behaviors, policy and regulations and penalties increase awareness among the trainees and reduce offences. This is observed in the case of educational programs addressing drinking and driving (afWåhlberg 2010), and drug use in the workplace (Quazi 1993). Similarly, in a business domain, the ongoing security education, training

and awareness (SETA) program can deter misuse attempts by providing information about correct and incorrect usage of information systems, information about punishment associated with incorrect usage and knowledge of organizational enforcement activities (Wybo & Straub 1989). There is no study that relates HIPPA training to medical data misuse. However, we believe that results on IS misuse in business and finance contexts would apply in this case. HIPAA training modules generally emphasize the penalties for potential abusers when the breach is intentional. Thus emphasizing both institutional security policy acknowledgment and HIPAA knowledge and training will increase the perceived certainty and severity of sanctions for medical data misuse among healthcare providers. Therefore, we propose that:

Hypothesis 3A (H3A): User awareness of hospital information security policies and HIPAA knowledge and trainings has positive association with perceived certainty of sanctions.

Hypothesis 3B (H3B): User awareness of hospital information security policies and HIPAA knowledge and trainings has positive association with perceived severity of sanctions.

2.4.4 Technical Countermeasures

The definitions of monitoring and auditing in healthcare were defined by the focus group Health Care Compliance Association (HCCA) and Association of Healthcare Internal Auditors (AHIA) (Ruppert 2004). According to that group, monitoring is an ongoing process, usually directed by management to ensure that processes are working as intended. Monitoring is also an effective detective control within a process. Auditing is a

formal, systematic and disciplined approach, designed to evaluate, and improve the effectiveness of processes, and related controls. For IS misuse in health care, monitoring seeks to evaluate activities on a routine basis for abnormal patterns, while auditing represents a formal evaluation governed by professional standards on a periodic basis.

End-users' computer monitoring is regularly used in the organizations in order to assure compliance with rules and regulations and reduce non-compliant behaviors (Urbaczewski & Jessup 2002). The American Health Information Management Association (AHIMA) has assembled a guideline for healthcare institutions to prevent falsifications of EHRs (AHIMA 2005). The guideline recommends that organization establish policies that comply with laws and regulations, and establish an EHR training course for the users. The training course should include details of how audit processes are conducted within the system. For example, the monitoring will start as soon as the users log on to the system, will track all the activities that the users perform with medical data, and generate an auditable record that include date/time and involved users when an incident is detected.

Deterrence research in criminology suggests that monitoring increases perceived certainty of sanctions (Wentzel 2004) and severity of sanctions (Kinsey 1992). Kinsey (1992) reported that Internal Revenue Service (IRS) auditing practices was positively associated with perceived severity of tax evasion penalties. A study by Dubin (1990) reported a positive relationship between IRS audits and tax compliance which is consistent with the notion that monitoring increases sanction perceptions. For IS misuse, Straub (1990) and Straub & Nance (1990) found that monitoring and surveillance can increase perceived certainty and severity of sanctions and reduce IS misuse activities.

Thus, if the individuals perceive that their activities are routinely monitored or audited, their perceptions of being caught and subsequently punished for IS misuse will be increased. Therefore, we hypothesize that:

Hypothesis 4A (H4A): User awareness of computer monitoring and auditing practices is positively associated with perceived certainty of sanctions.

Hypothesis 4B (H4B): User awareness of computer monitoring and auditing practices is positively associated with perceived severity of sanctions.

2.4.5 Control Variables

In a previous study (D'Arcy et al 2009, Hovac &D'Arcy 2012), gender and age are suggested as additional variables because of their potential influence on IS misuse intention. We choose to utilize these two constructs as control variables. In addition, since HIPAA training needs to be tailored for the specific jobs of individuals, we also use role as a control variable.

2.5 RESEARCH METHODOLOGY

This section describes the research methodology involved in this study, including sampling procedure, the development of our constructs and scales, and the analytical procedures.

2.5.1 Measurements

A survey was used for data collection in order to test the relationships implied by the research model and the research hypotheses. This study involves the measurement of five constructs. The survey sought to measure the healthcare providers' perceptions of the certainty (PC) and severity (PS) of institutional sanctions, and the intention for engaging in medical data misuse (INT). It also measured the healthcare providers' awareness of procedural countermeasures (PCM) including hospital information security policies, and HIPAA knowledge and training and technical countermeasures (TCM) including Electronic Health Records (EHR) monitoring and auditing.

Perceived certainty of sanctions, perceived severity of sanctions, and intention to misuse medical data were measured through Likert scale items. Since these items would normally be considered intrusive, and respondents are unlikely to admit that they engage in such behavior, an alternative approach to asking the questions directly is needed. We elected to do this using a set of four medical data misuse scenarios. Scenarios were used because they are a nonintrusive method, they improve participants' ability to response (Nagin & Pogarsky 2001, D'Arcy et al. 2009), they safeguard the participants, and they improve internal validity (Nagin & Pogarsky 2001). The four scenarios involving medical data misuse were created based on common situations that happen in the healthcare circumstances. The scenarios included in the survey were about; 1) using colleague's account, 2) downloading medical data into personal devices, 3) unauthorized access, and 4) sharing medical data via a social network application. For each scenarios, participants replied to questions measuring INT, PC and PS. These constructs were measured with two items scales. The measured items were adapted from D'Arcy et al (2009) and Hovav

& D'Arcy (2012).Each item was rated on agree- disagree-7-point- Likert scale which ranges from (1) strongly disagree to (7) strongly agree. As the study aimed to examine the generalized pattern of medical data misuse behaviors rather than specific behaviors according each scenarios, the composite measures of INT, PC and PS were created by summing the rating scores to these items across the four scenarios *(*from D'Arcy et al 2009 , Hovav & D'Arcy 2012). The second part of the survey examines the healthcare providers' perception and awareness of countermeasures. The two constructs (PCM and TCM) were measured using multi-item scales adapted from D'Arcy et al (2009), Hovav & D'Arcy (2012), and HIPAA and HITEC acts. Each item is rated on agree-disagree 7-point- Likert scale with 1 denoting strongly disagree and 7 denoting strongly agree.

The instrument was pre-tested with 11 healthcare providers over a period of two-weeks. Pre-tested participants indicated that the scenarios reflected realistic situations in healthcare settings and they had little difficulty placing themselves in the hypothetical position of the scenario characters. Wording changes to some scenarios were suggested in order to improve the clarity of the scenarios. For the countermeasure items, wording changes were suggested to reduce the respondents' biases. Some of the items were revised or removed prior to administering the final survey.

2.5.2 Study Context and Samples

This study focused on four groups of healthcare providers - physicians, registered nurses, medical students and nursing students. We focused on these providers since they deal with patients and use medical data a lot. Participants were recruited from the US. Physicians and registered nurses were enrolled via associations of physicians,

associations of nurses, and from their hospitals. Medical students were enrolled from a Midwestern hospital and senior nursing students were enrolled from a Midwestern university. All subjects were voluntary and there was no monetary incentive provided for participation. . An email invitation that included the online survey link was sent to physicians, nurses, medical students and nursing students by a collaborator of each study site.

2.6 ANALYSIS AND RESULTS

We used SPSS 21.0 for performing descriptive statistics analysis, factor analysis and construct validity and AMOS 21.0 for performing structural equation modeling analysis (SEM). Structural equation modeling was used to assess the model causality. In our model, the antecedents are procedural countermeasures (PCM) and technical countermeasures (TCM) where the medical data misuse (INT) is a consequence. Perceived certainty of sanctions (PC) and perceived severity of sanctions (PS) are mediators that mediate relationships between PCM-INT and TCM-INT path.

A total 253 healthcare providers joined the survey. After discarding the incomplete and un-engaged data, there were 176 usable responses (69.6%). A summary of the demographic characteristics of participants is provided in Table 2.1.

Table 2.1: Demographic Characteristics of Respondents

	Survey Participants (N=176)	
	Frequency	Percent
Gender		
Male	76	43.2%
Female	100	56.8%
Age		
18-24	33	18.8%
25-34	60	34.1%
35-44	23	13.1%
45-54	19	10.8%
55-64	15	8.5%
65 and over	26	14.8%
Roles		
Medical student	10	5.7%
Nursing student	59	33.5%
Physician	71	40.3%
Nurse	36	20.5%
EHR experiences		
< 1 year	35	19.9%
1-2 year	34	19.3%
3-5 year	58	33%
6-10 year	36	20.5%
>10 year	13	7.4%
EHR class attended		
Never	18	10.2%
1-3	81	46%
4-6	46	26.1%
7-10	16	9.1%
>10	15	8.5%
Smartphone use		
Yes	149	84.7%
No	27	15.3%
Tablet use		
Yes	98	55.7%
No	78	44.3%

2.6.1 Measurement Model

We assessed the psychometric properties of the model though internal

consistency, convergent validities, and discriminant validities. Internal consistency is

indicated using composite reliability (CR) and Cronbach's alpha (Cronbach 1951, Fornell

& Larcker 1981). A Chronbach's alpha and CR score above 0.7 indicate good internal

consistency of the data (Cronbach 1951, Fornell & Larcker 1981). Convergent validity is demonstrated using these criteria; item loadings are in excess of 0.7 (Gefen et al 2000), average variance extracted (AVE) for each construct exceed 0.5 (Fornell & Larcker 1981) and/or the average of all factor loadings from the same constructs is greater than 0.7 (Fornell & Larcker 1981). Hair et al. (2010) argued Gefen et al (2000) that regardless of using only one cut-off score at 0.7 for all items, the sufficient/significant loadings are depended on sample size and with the samples more than 150 as our study, the factor loadings value greater than 0.45 is considered sufficient. The discriminant validity is demonstrated if the variables load significantly only on one factor (Hair et al. 2010, Gefen et al 2000) and the square root of the AVE for each construct is larger than the inter-construct correlation (Fornell & Larcker 1981). If cross-loadings exist, the discriminant validity should meet the criteria that the cross-loading coefficients on loading constructs should differ by more than 0.2, no cross factor loading loads on other items more than 0.4 (Gaskin 2010a), and a correlation factor between constructs in factor correlation matrix should not exceed 0.7 (Gaskin 2010a).The values for reliability, convergent validity and discriminate validity in our study were acceptable.

2.6.2 Exploratory Factor Analysis (EFA)

Prior to doing SEM analysis, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) approaches were performed to examine the internal reliability of a measure (Newsom 2005). Construct validity tests were conducted to check the degree of a measure whether it can test what it claims (Brown 1996). Maximal Likelihood (ML) was used in this study as this method is generally recommended and it gives the good results when the data is distributed normally. In addition, ML is the closet method to

CFA among extraction method and it is recommended if the study is heading to perform CFA (Cudeck & O'Dell 1994). Prior to applying ML, the normality of the observed variables was tested. Following the rules of thumb suggested by Curran et al. (1996) mention that moderate normality thresholds of 2.0 for skewness and 7.0 for kurtosis is acceptable when assessing multivariate normality. However, a recent research argued that ML estimation method can be used for data with minor deviations from normality (Raykov and Widaman, 1995). Thus, in our study we followed these two assumptions by using cut-off thresholds 2.0 for skewness and 7.0 for kurtosis and allowed minor deviations from normality. In addition, rotation is applied to rotate factors in multidimensional space in order to arrive at a solution with the best simple structure. The oblique rotation, Promax, was used in this study since it produces solutions with better simple structure than orthogonal rotation, and oblique rotation allows factors to correlate, and produces estimates of correlations among factors (Fabrigar et al 1999). Factor loadings and cross-loadings are the results produced from EFA. Generally, factor loadings load cleanly on the constructs where they are intended to load and do not cross-load on the construct to which they should not load (Straub et. al 2004).

Prior to performing EFA, normality and the appropriateness of the data were checked. Normality testing in our data showed that PCM 1(2.6) and PCM 3 (2.4) have univariate skewness; the skewness was greater than 2 in absolute value and PCM1 (9.2) and PCM 3 (7.2) have univariate kurtosis in absolute value were greater than 7. Thus, we removed PCM 1 in order to make our data met the assumption of normal distribution. The appropriateness of data was performed to indicate that the variables relate to one another enough to run a meaningful EFA (Gaskin2012a). The Kaiser-Meyer-Olkin

Measure of Sampling Adequacy was 0.802, indicated meritorious (Gaskin 2012a) and Bartlett's Test of Sphericity is significant (p<0.001), indicated the relation of the variable (Gaskin 2012a). PCM 2 and PCM 4 were further removed since each had its factor loading less than 0.45. After these items were removed from the analysis, the results were improved. The results of the EFA (Table 2) indicated the items used in this study met the requirement for convergent and discriminant validity. The criteria for convergent validity was met because all factors loaded highly on their constructs (Table 2.2) and each item loaded significantly (p<0.01) on its own construct and had higher correlation on its own than others (Loch et al 2003). The significance of each item to its own construct was confirmed by the correlation analysis. The results of the correlation analysis are provided on Table 2.3. Also, the average variance extracted (AVE) for each construct that exceeded 0.5 (Table 2.5), confirmed convergent validity. The criteria for discriminant validity was met because all factors load significantly higher on their own constructs (Table 2.3), no cross factor loadings loaded above 0.40 (Table 2.2), correlation factor between constructs in factor correlation matrix did not exceed 0.7,(Table 2.4) and the square root of the AVE for each construct was larger than the inter-construct correlation (Table 2.5). For the internal consistency, the results of Cronbach alpha score are provided in Table 2.2 and the results of composite reliability are provided in Table 2.5.

Table 2.2: Results of Exploratory Factor Analysis (Loadings and Cross loadings) and Cronbach Alpha Scores

	Factors				
	TCM	PCM	INT	PS	PC
Cronbach	**0.92**	**0.84**	**0.99**	**0.95**	**0.95**
TCM1	**.74**	.07	-.02	.03	.02
TCM2	**.81**	-.06	-.06	-.11	-.04
TCM3	**.84**	.04	.06	.05	-.03

TCM4	**.92**	-.11	-.00	.04	-.00
TCM5	**.83**	.06	-.07	-.05	.06
PCM3	-.03	**.56**	-.20	.02	.00
PCM5	.20	**.75**	.13	.03	-.02
PCM6	-.16	**1.06**	-.06	-.07	.00
PCM7	.27	**.57**	.09	.05	-.00
INT1	.00	-.04	**.96**	-.02	-.00
INT2	-.06	-.00	**.99**	.00	.00
PS1	-.03	.00	-.03	**1.02**	-.03
PS2	-.01	-.01	.01	**.89**	.06
PC1	-.01	-.03	-.00	.03	**.92**
PC2	.01	.03	.01	-.00	**.98**

Note TCM= technical countermeasures, PCM = procedural countermeasures, INT1 and INT2= composite score of medical data misuse from 4 scenarios, PS1 and PS2 = composite score of perceived severity of sanctions from 4 scenarios, PC1 and PC 2= composite score of perceived certainty of sanctions from 4 scenarios

Table 2.3: Item to Construct Correlation vs. Correlations with Other Constructs

	INT1	INT2	PC1	PC2	PS1	PS2	PCM	TCM
INT1.1	**.76**[**]	.74[**]	-.26[**]	-.31[**]	-.24[**]	-.21[**]	-.32[**]	-.34[**]
INT1.2	**.70**[**]	.68[**]	-.15[*]	-.17[*]	-.24[**]	-.22[**]	-.15	-.13
INT1.3	**.54**[**]	.51[**]	.07	.08	.05	.10	-.12	-.04
INT1.4	**.68**[**]	.66[**]	-.14	-.14	-.25[**]	-.20[**]	-.18[*]	-.02
INT2.1	.71[**]	**.75**[**]	-.25[**]	-.30[**]	-.19[*]	-.17[*]	-.30[**]	-.37[**]
INT2.2	.66[**]	**.69**[**]	-.16[*]	-.16[*]	-.24[**]	-.20[**]	-.15[*]	-.13
INT2.3	.46[**]	**.47**[**]	.07	.10	.06	.10	-.09	-.01
INT2.4	.68[**]	**.67**[**]	-.15[*]	-.15	-.25[**]	-.21[**]	-.20[**]	-.03
PC1.1	-.21[**]	-.23[**]	**.76**[**]	.62[**]	.37[**]	.33[**]	.23[**]	.31[**]
PC1.2	-.14	-.16[*]	**.78**[**]	.69[**]	.45[**]	.42[**]	.14	.26[**]
PC1.3	-.18[*]	-.18[*]	**.79**[**]	.81[**]	.46[**]	.49[**]	.23[**]	.42[**]
PC1.4	-.16[*]	-.15	**.75**[**]	.71[**]	.45[**]	.46[**]	.21[**]	.19[*]
PC2.1	-.23[**]	-.24[**]	.71[**]	**.79**[**]	.42[**]	.39[**]	.26[**]	.41[**]
PC2.2	-.19[*]	-.20[**]	.75[**]	**.85**[**]	.50[**]	.49[**]	.24[**]	.34[**]
PC2.3	-.21[**]	-.19[*]	.76[**]	**.85**[**]	.48[**]	.52[**]	.25[**]	.44[**]

PC2.4	-.20**	-.19*	.76**	**.78****	.46**	.49**	.29**	.28**
PS1.1	-.28**	-.28**	.45**	.52**	**.77****	.67**	.34**	.32**
PS1.2	-.22**	-.21**	.48**	.49**	**.82****	.76**	.24**	.28**
PS1.3	-.13	-.12	.35**	.37**	**.78****	.71**	.27**	.24**
PS1.4	-.27**	-.24**	.40**	.36**	**.71****	.67**	.22**	.05
PS2.1	-.28**	-.28**	.47**	.54**	.73**	**.80****	.25**	.34**
PS2.2	-.19*	-.18*	.49**	.51**	.79**	**.86****	.23**	.28**
PS2.3	-.05	-.04	.36**	.40**	.71**	**.78****	.24**	.23**
PS2.4	-.26**	-.23**	.41**	.38**	.69**	**.75****	.18*	.06
PCM3	-.37**	-.37**	.16*	.23**	.27**	.24**	**.73****	.35**
PCM5	-.16*	-.16*	.24**	.31**	.31**	.27**	**.77****	.60**
PCM6	-.35**	-.34**	.18*	.25**	.28**	.25**	**.81****	.45**
PCM7	-.16*	-.16*	.28**	.32**	.31**	.28**	**.71****	.58**
TCM1	-.20**	-.23**	.37**	.41**	.29**	.25**	.55**	**.86****
TCM2	-.16*	-.20**	.22**	.27**	.11	.11	.44**	**.82****
TCM3	-.15*	-.15*	.33**	.40**	.29**	.28**	.54**	**.88****
TCM4	-.17*	-.19**	.36**	.42**	.28**	.29**	.42**	**.88****
TCM5	-.26**	-.28**	.38**	.46**	.28**	.32**	.54**	**.89****

** Correlation is significant at the 0.01 level (2-tailed) and *. Correlation is significant at the 0.05 level (2-tailed)

Table 2.4: Factor Correlation Matrix

Factor	TCM	PCM	INT	PS	PC
TCM	**1.00**	.60	-.19	.33	.46
PCM	.60	**1.00**	-.29	.36	.30
INT	-.19	-.29	**1.00**	-.26	-.24
PS	.33	.36	-.26	**1.00**	.60
PC	.46	.30	-.24	.60	**1.00**

Table 2.5: Result of Means, SDs, Reliabilities, and Correlations

	#of items	Mean	SD	Range of Factor Loadings	CR	AVE	Interconstruct correlations				
							PS	TCM	PCM	INT	PC
PS	8	4.88	1.32	0.81-0.88	0.96	0.92	**0.96**				
TCM	5	5.50	1.29	0.69-0.83	0.90	0.66	0.34	**0.81**			
PCM	4	6.22	0.95	0.65-0.74	0.87	0.62	0.36	0.68	**0.79**		
INT	8	2.01	1.02	0.79-0.92	0.99	0.97	-0.30	-0.26	-0.30	**0.99**	
PC	8	4.45	1.38	0.64-0.83	0.96	0.92	0.60	0.50	0.34	-0.26	**0.96**

Bold scores = the square root of AVE

2.6.3 Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis (CFA) was performed using AMOS 21 to check on the construct and identify the model fitness. The Maximum Likelihood (ML) estimation method was employed. The overall fit indices suggested a good fit of the model to the data; most of the indices were greater than the recommended cut-off scores (see Table 2.6).

Table 2.6: Confirmatory Factor Analysis and Fit Indices

Fit Indices										
	χ^2(DF)	χ^2/DF	NFI	IFI	TLI	CFI	GFI	AGFI	SRMR	RMSEA
Good fit		<3.00	>0.90	>0.90	>0.90	>0.90	≈0.90	>0.80	<0.10	<0.80
Model	**154.05(76)**	**2.03**	**0.94**	**0.97**	**0.96**	**0.97**	**0.90**	**0.86**	**0.05**	**0.77**

2.6.4 Common Method Bias (CMB)

Common method bias was assessed with two tests – Harman's single factor test and common latent factors. The Harman's single-factor test was conducted to see if the majority of the variance can be explained by a single factor (Podsakoff el al 2003). The test was conducted using unrotated principal components factor analysis with 15

extracted measures from EFA. The results showed that there was no single factor emerged from the unrotated solution, indicating CMB is not the issue. Common latent factor (CLF) analysis was conducted to capture the common variance among all observed variables in the model (Gaskin2012b). CLF was performed using AMOS. To do this, we applied CLF in our CFA model and compared the standardized regression weights from this model to the standardized regression weights of a model without CLF. The results showed that the larger differences (the difference greater than 0.2) (Gaskin2012b) were found in TCM, PCM and INT2 indicating there was CMB in our measures. To resolve the CMB, we imputed CLF to our model to create composites and used these composite scores for examining our SEM model (Gaskin2012b).

2.6.5 Invariance Test

An invariance test was performed to indicate that the same construct is being measured across some specified groups (i.e age, gender,etc.) (Gaskin2012c). To do this (Gaskin2012c), we created the variable called total_exp. Total_exp was calculated by summing EHRexperience, Smartphone using experience and tablet using experience. Then we used the median of total_exp to separate the total_exp into two groups called hi_exp and lo_exp. We then compared the unstandardized regression weight differences of the measure items of these two groups from the CFA model. If the significant differences of the items between these two groups occur, the meaningful interpretation of measurement data is precluded. The results showed that there were no significant differences of measure items of these two groups (hi_exp and lo_exp), indicating that the factor structure and loadings are sufficiently equivalent across groups.

2.6.6 Structural Equation Model (SEM)

Prior to testing our SEM model, we performed two tests to check multivariate assumptions, including linearity and homoscedasticity. The linearity test was done in order to confirm that the model is sufficient (the path is significant in linear model) for testing by using on SEM (AMOS), since AMOS fits only linear equation model (Gaskin2012d). To do this, we did curve estimations for all paths in our model. The results showed that all paths were significant when applying linear model.) Homoscedasticity was assessed to confirm that the consistent variance across different levels of the variable is existed because serious violations in homoscedasticity (assuming a distribution of data is homoscedastic when in actuality it is heteroscedastic) may result in overestimating the goodness of fit as measured by the Pearson coefficient (Hair et al. 2010). To do this, we applied linear regression to our paths and plotted each relationship between regression standardized residual of dependent variable and regression standardized predicted value of independent variable. We found that all paths had consistent relationships which mean that the homoscedasticity for all paths were met (Hair et al 2010).

Hypotheses were tested by examining the results of the structural equation modeling. The test includes estimating the path coefficients, which indicate the strength of the relationships between the independent and dependent variables and the R^2 value (the variance explained by the independent variables) (Hair et al 2010). Results of the analysis including standardized path coefficients, significance, and the amount of variance explained (R^2 value) for each dependent variable is shown on Figure 2.2. Also the model fit values are shown below Figure 2.2.

Figure 2.2: Results of SEM Analysis
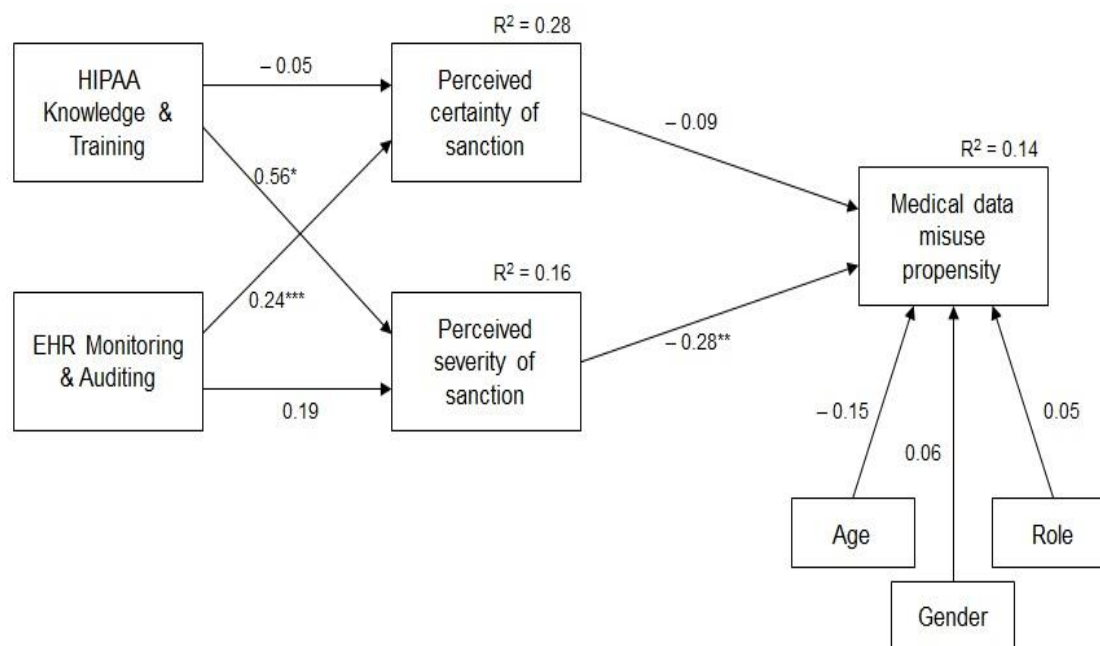
P value <0.05 *, <0.01**, <0.001***

	χ^2(DF)	χ^2/DF	NFI	IFI	TLI	CFI	GFI	AGFI	SRMR	RMSEA
Model	154.05(76)	2.47	0.91	0.95	0.89	0.94	0.95	0.88	0.08	0.09

The results showed that consistent with H1 and H2, perceived certainty of

sanctions (PC) and perceived severity of sanctions (PS) had negative association with

medical data misuse (INT). However, only PS showed a significant negative effect on

INT (p<0.01). Consistent with H4A and H4B, monitoring and auditing (TCM) had

positive association with PC and PS; only the effect on PC was significant (p<0.001).

PCM had non- significant negative effect on PC, which was contrasting H3A. Hence

H3A was not supported. Consistent with H3B, knowledge (PCM) had positive significant

effect on PS (p <0.05). Thus H3B was supported. R^2 (Coefficient of Determination) for

dependent variables which were 0.28 for PC, 0.16 for PS and 0.14 for INT meant that

PCM and TCM explain 28% of the variance in PC and 16% of the variance in PS and the

combination of PC, PS, and control variables explained 14% of variance in medical data misuse (INT). We also did further examination and found that PC and PS alone explained 6% and 7% of the variance in INT. The R^2 values for all endogenous constructs exceed 10%, implying a satisfactory and significant model (Falk & Miller 1992). Age had negative effect on INT and explained 0.5 % of variance on INT. However, the effect is not significant. The summary of hypotheses testing was provided in Table 2.7. All model fit values in the model fit table indicated good fit.

Table 2.7: Summary of Hypotheses Tests

Hyp.no.	Hypothesis	Path (direction)	Significance coefficient(2- tailed)	supported?
H1	PC → INT(-)	-0.09	NS	Yes but NS
H2	PS → INT(-)	-0.28	P <0.01	Yes and sig
H3A	PCM →PC(+)	-0.05	NS	No
H3B	PCM→PS(+)	0.28	P <0.05	Yes and Sig
H4A	TCM →PC(+)	0.56	P <0.001	Yes and Sig
H4B	TCM →PS(+)	0.19	NS	Yes but NS
Controls	Age →INT	-0.15	NS	
	Sex →INT	0.06	NS	
	Role →INT	0.05	NS	

Note; PC= Perceived certainty; PS= Perceived severity; INT= Medical data misuse; PCM= Hospital policy and HIPAA knowledge and training; TCM = EHR monitoring and auditing

2.6.7 Mediation

The mediation effect was also tested in our study. The mediation effect was tested because we had perceived certainty of sanctions (PC) and perceived severity of sanctions (PS) as mediators. The mediation effect was tested using Baron and Kenny's approach (Baron & Kenny 1968) and Preacher & Hayes Bootstrapping method (Preacher & Hayes 2004). The Baron and Kenny's approach tests the mediation by measuring the differences of direct effect of PCM on INT and TCM on INT and the direct effect of PCM on INT via mediators (PC and PS) and the direct effect of TCM on INT via mediators (PC and

PS). The Preacher and & Hayes Bootstrapping method measures the indirect effect. Benefit of the Preacher and Hayes Bootstrapping method is that it is a non-parametric test so assumptions of normality is not required while Barron and Kenny's does. Thus it is more common to a recent publication to report both methods when testing mediation effect. Mediation can be divided into 3 groups according to each assumption (Gaskin 2012a): 1) partial mediation means that both the direct and indirect effects from the independent variable to dependent variable are significant, 2) full mediation means that the direct effect drops out of significance when the mediator is added, and that the indirect effect is significant and 3) indirect means that the direct effect never was significant, but that the indirect effect is. We found that PS had full mediation effect on path between PCM and INT. Considering only Baron and Kenny (1968), PC also had full mediation effect on path between PCM and INT because the direct effect dropped its significance when applying PC as a mediator. There was no mediation effect of PC and PS found on TCM and INT paths. For indirect meditation effect, there is indirect mediation effect of PS on PCM-INT path and indirect mediation effect of PC and PS also appeared in the relationship between TCM and PCM on INT when PCM was added on TCM and both were tested at the same time. The results of the mediation effects are provided in Table 2.8.

Table 2.8: Summary of Mediation Effects

Relationships	Direct without mediator	Direct with mediator	Indirect
PCM-PC-INT	-0.22(0.03)	-0.16 (NS)	NS (no mediation)
PCM-PS-INT	-0.22(0.03)	-0.16 (NS)	0.02
TCM-PC-INT	-0.12(NS)	-0.07 (NS)	NS (no mediation)
TCM-PS-INT	-0.12(NS)	-0.07 (NS)	NS(no mediation)
PCM+TCM-PC-INT			NS(no mediation)

PCM+TCM-PS-INT			NS(no mediation)
TCM+PCM-PC-INT			P=.008(**)(Mediation)
TCM+PCM-PS-INT			P=.043(*)(Mediation)

Notes: *** p-value < 0.001; ** p-value < 0.01; * p-value < 0.05. PCM+TCM = add TCM on PCM-INT path and TCM+PCM = add PCM on TCM-INT path

2.6.8 Post Hoc Analysis

We did post-hoc power analysis with 95% confidential interval in order to check whether our sample size has strong statistical power to conclude our hypotheses. We got observed statistical power = 0.994 (cut-off is 0.8). This means that our sample size has enough power.

2.7 DISCUSSION

The results indicate that controlling for age, gender and role, perceived certainty of sanctions and perceived severity of sanctions has a direct negative effect on medical data misuse but only perceived severity of sanctions had a significant effect. The results suggest that for an extended general deterrence theory in the context of medical data misuse in healthcare settings, PS has stronger influence to INT than PC. This finding was consistent with Skinner & Fream (1997) and D' Arcy et al (2009). However it contradicts the study by Peternoster (1987) and Herath & Rao (2009) that indicated that PC was much greater than PS, and PS had a negative effect on policy compliance behaviors. Analysis of the model indicates that PC and PS are key intervening variables linking security countermeasures. PCM and TCM, each has a positive effect on PS and TCM has a positive effect on PC while PCM has a negative association on PC. This negative association of PCM on PC was also presented in D'Arcy et al (2009) study. The

mediation effect reported the path between PCM and INT that PS has full mediation effect and PC and PS have indirect mediation effect between TCM+PCM on INT.

Medical data misuse is dependent on a combination of PC and PS. However, the two antecedents explained 14% of the variance in medical data misuse. Therefore, additional antecedents need to be included to increase explanatory power in a future study. Examples of candidate antecedents in a future model are moral belief and social norms. 1) Moral belief, a factor suggested by Bachman et al (1992), which could be incorporated into the model since the deterrence effects of PC and PS depend on moral consideration. His study revealed that those individuals with strong moral inhibition were restrained from deviant behavior and therefore the threat of punishment was irrelevant. Also, D'Arcy et al (2009) tested the moral commitment as a moderator in his model. His study found that those individuals with high moral inhibition had high perceptions of being caught while those individuals with low moral inhibition had high perceptions of punishment. 2) Another factor that should be added is social norm since coworker socialization is related to employees' perception of the information security (Chan et al 2005).

2.7.1 Hospital information security policies and HIPAA knowledge and training

The significant direct and indirect effect of hospital information security policies and HIPAA knowledge and training suggests that when healthcare providers are aware of the hospital information security policies and HIPAA, they are less likely to engage in medical data misuse. The effectiveness of hospital information security policies and

HIPAA knowledge and training on perceived severity of sanction is more important as our result suggested that PS is stronger deterrent in medical data misuse.

The unexpected negative relationship between PCM and PC deserves some attention. The negative relationship for this path means that the awareness of the hospital information security policies and HIPAA does not increase the healthcare providers' perception of getting caught for medical data misuse. A plausible explanation might be the hospital policy and HIPAA knowledge and training emphasize more on severity of sanctions (i.e fine, jail time, healthcare professional's license withholding or withdrawal) rather than certainty of sanctions (i.e detecting security incidents). Thus people are aware of severity of sanctions more than certainty of sanctions. Also, D'Arcy et al (2009) and Whitman (2004) explained in their studies that this situation might happen because upon users knowing about information security policies, they realize the difficulties in detecting misuse and find that only a small percentage of computer security incidents are actually discovered.

From a methodological perspective, the scenarios used in the study may also contribute to the unexpected result. We used the scenarios that occurred commonly in healthcare settings. When these situations appeared, they were usually overlooked by healthcare providers as medical data misuse and usually healthcare providers are not caught or reported because of these behaviors. This was confirmed by the comments from healthcare providers that we received on the pre-test, starting that "the scenarios are more realistic and common than many realize that these kinds of behaviors are considered

misuse" and "the scenarios were very thought provoking about some usual behaviors considered medical data misuse".

For mediation effect, PS was a full mediator between PCM and INT. It means that PCM does not have direct effect on medical data misuse but the effect of PCM is mediated through PS. This suggests that by emphasizing the severity of sanctions on hospital information security policies and HIPAA trainings will increase perceived severity of sanctions and as a result, it reduces the medical data misuse.

2.7.2 EHR monitoring and auditing

The awareness of EHR monitoring and auditing was shown to have positive effect on perceived certainty of sanctions and severity of sanctions that can help deter medical data misuse. The influence of EHR monitoring and auditing on perceived certainty of sanctions was stronger than PCM countermeasures. Consistent with prior research (D'Arcy et al 2009), this suggests that EHR monitoring and auditing is a useful method to convince people to avoid misuse activities as these activities will be discovered. The significant effect of EHR monitoring and auditing on perceived severity of sanctions indicates that EHR monitoring and auditing is an effective countermeasure for decreasing medical data misuse.

The mediation effect showed that when combining PCM with TCM but not TCM with PCM, the indirect mediation effects of PC and PS were presented. The plausible explanation might be because PC and PS has no mediation effect on TCM and INT path but PC and PS showed some degree of mediation effect on PCM and INT path.

Therefore, when adding PCM on TCM and INT path, the indirect mediation effect on TCM+PCM was shown. This suggests that healthcare institutions need to emphasize their employees on the institutional information security policy and HIPAA along with rigorous EHR monitoring and auditing in order to reduce medical data misuse.

2.7.3 Control variables

Age has a negative effect on medical data misuse intention even though it is not significant. This suggests that older healthcare providers are more aware of medical data misuse than their younger counterparts. We further examined the differences of medical misuse scores among these groups by using oneway- ANOVA and did post hoc analysis using Bonferini test. The results revealed that healthcare providers between 55-64 years had the lowest medical data misuse score while respondents between 25-34 years had the highest score on medical data misuse. A possible explanation might relate to IT experience. Younger providers are more familiar with IT technology and have focused on the benefits of using IT than the IT risks. Consistent with prior research (Dutton & Shepherd 2003), people who have more technology experience tend to have less concern about IT risks. Thus, those who are 25-34 might not take the usual situations that relate to the medical data misuse seriously. Also, this finding is consistent with Hovav &D' Arcy (2009) that found that in the US sample, age had significant negative relationship to INT . To our knowledge, the age of healthcare providers that associates with medical data misuse has not been reported in previous work.

2.8 RESEARCH CONTRIBUTIONS

This study supports the practice information security in healthcare settings. It is the first study that applies the deterrence theory to examine healthcare providers in healthcare settings. By examining which security countermeasures affect medical data misuse, the study emphasizes the importance of perceived severity of sanctions over perceived certainty of sanctions on medical data misuse. Although the finding was contrary to a number of deterrence studies in the criminological literatures, it is consistent with IS misuse in the organizations' studies. The assumption might be the GDT in the context of medical data misuse differs from the interpretations of the theory (D'Arcy 2009). Second, we found hospital information security policies and HIPAA training increase perceived severity of sanctions and trainings, and EHR monitoring and auditing increase both perceived certainty of sanctions and perceived severity of sanctions and associated medical data misuse. Also, PC and PS have some direct mediation and indirect mediation effects between PCM and TCM on medical data misuse. This has demonstrated support for applying deterrence in studying healthcare providers' misuse of medical data in institutions. Third, participants in this study were enrolled from different healthcare institutions across the US. Therefore, the population is representative of the attitude of healthcare providers in US healthcare settings. Last, the results of the study provide healthcare executives insights on how to reduce medical data misuse of the employees by managing the hospital information security policies and HIPAA training and EHR monitoring and auditing effectiveness. As medical data misuse continues to be a major concern for healthcare institutions, studies of this nature can aid the implementation of countermeasures.

2.9 LIMITATIONS AND FUTURE RESEARCH

Several limitations of the study can be addressed in the future work. First, the survey examined only the attitudes of participants. In real situations, there may be other circumstances or factors that affect people's decisions that make them respond differently regarding their intention. Although we created the scenarios based on common situations that happen in the healthcare setting, there is no guarantee that participants' answers would be similar to their experience in these situations. Future research that observes actual behaviors of healthcare providers at their institutions over a period of time can add to the credibility of the model. Second, additional factors could be included in the model. As discussed earlier, moral beliefs and social norms might be good candidates to add in order to better explain medical data misuse among healthcare providers. Third, the proposed model was tested with healthcare providers in a single country which limits the generalization of the results to global healthcare providers. Therefore, this study should be replicated and validated in other countries and with larger sample groups. Last, due to the specific hypothetical scenarios chosen, the measurement of medical data misuse is limited. The case scenarios do not cover all types of medical data misuse. Future research should add and test more scenarios relating to medical data misuse (i.e password sharing).

2.10 CONCLUSIONS

The objective of the study was to examine whether deterrence affects healthcare providers' perception on medical data misuse. It is the first time that the deterrence theory was applied to examine healthcare providers in the context of information security misuse in healthcare settings. The results suggest that procedural security countermeasures and technical security countermeasures each have some deterrent effect on medical data misuse intention either direct effect and mediation effect through perceived certainty and perceived severity of sanctions. This study confirms that general deterrence theory can be applied to the healthcare information security and we hope that the study provides a framework and sets the stage for future research in this arena.

CHAPTER 3

ESSAY 2: PROPENSITY TO MISUSE MEDICAL DATA
IN AN INTERNATIONAL CONTEXT –
DETERRENCE AND CULTURAL VALUES

3.1 INTRODUCTION

Growth in the use of information technology (IT) in healthcare is now a global phenomenon. Healthcare organizations in western and non-western countries have adopted IT to improve their services. Rules and regulations regarding the use of IT in healthcare have been promulgated at the national and local levels. Healthcare organizations have to adopt, develop, and establish their own information security policies and IT acceptable usages to be compliant with government regulations. In the US, HIPPA and HITECH acts have been launched to protect medical data misuse, and promote a safe environment for IT use in healthcare settings. These acts have already been reviewed in the previous chapter. In Thailand, several data protection acts and royal decrees regarding information security have been established. Thai healthcare organizations have to ensure compliance by creating hospital information security policies that are consistent with the data protection laws and royal decrees. Although it seems like both the US and Thailand has similar rules and regulations to control IT use in healthcare, there are other factors like organizational cultures, social norms, and moral belief differences that might affect medical information misuse in the healthcare organizations.

In particular, when a question about generalization of the study between Asian and American culture is raised, Hofstede's national cultural dimensions, combined with the influences of Confucianism and face-saving, are considered as moderating factors since cultural values can affect the study results. Previous studies in the context of information security (IS) and national cultures by Chow (2004) and Hovav & D'Arcy (2012) have reported that national cultural values have a powerful influence on people's attitudes, and influence the adoption, use, and management of IS. In addition, Havov & D'Arcy (2012) contended in their study about the deterrence on IS misuse for the US and Korea users that the effects of security countermeasures varied between the two countries. Korean users complied with the certainty of procedural countermeasures whereas US users complied with severity of procedural countermeasures. The study also found that age and gender played a role in IS misuse. In western culture, age had a negative association with IS misuse, whereas the opposite relationship was found in non-western culture. While it is tempting to use Hofestede's national cultural values, the notion that all individuals from a specific nation will exhibit exactly those values is questionable. Accordingly, when analyzing at the individual level, the use of an individual's espoused national cultural values is more appropriate (Srite &Karahanna 2006). The term, espoused national cultural values, is defined as the degree to which an individual embraces the values of his or her national culture. Therefore, in order to examine the effect of cultural values on medical data misuse. We examined cultural values at both the national level and individual levels.

A recent review of D'Arcy & Herath (2011) and a study by Hovav & D'Arcy (2012) found that the predictive power of deterrence on IS misuse could be enhanced

through the identification of additional factors, i.e. moral beliefs, social norms, social status, etc. In order to expand effectiveness and achieve greater prediction power of the deterrence, we included moral belief and social norms as informal sanctions in our model.

To compare the differences between two cultures, we selected medical providers in the US and Thailand. We selected these two countries for a number of reasons. First, these two countries employ similar fundamental policies governing private health information. These include laws covering electronic collecting and processing of private data; institutional policies that govern the access of medical data by healthcare providers and their duty to protect this data; institutional monitoring and auditing of access and medical data use. The similarity of these two countries eliminates effects due to different regulatory environments. Second, these two countries represent markedly different cultures (i.e. Western and Asian culture). This will permit the investigation of culture on the propensity to misuse medical data. There are no studies that compare medical data misuse in developed and developing countries.

As our study addresses medical data misuse propensity of healthcare providers at an individual level, and at a national level, we hypothesize that cultural values that the individual espoused moderate the relationship between sanctions and medical data misuse. In addition, national cultural values would play a role in the model relationships. Thus Thais and Americans will have different perceptions on deterrence, moral belief, and social norms that finally result in determining different decisions regarding propensity to misuse medical data. To respond to these two questions, the espoused

cultural norms based on Hofstede's cultural dimensions were used to moderate relationships in the combined model, and Hofstede's national cultural dimensions were used to contrast the models for the Thai and US cases, respectively.

As our study reviews and compares healthcare providers' propensity to misuse medical data and the legislation involving medical data misuse for the countries of the US and Thailand, legislations that involve with medical data misuse of the two countries (the US and Thailand) are reviewed and compared below.

3.2 LEGISLATION INVOLVING MEDICAL DATA

3.2.1 The United States Context

In the US, the key pieces of legislation addressing information security in the healthcare setting are the Health Insurance Portability and Accountability Act (HIPAA) of 1996 and Health Information Technology for Economic and Clinical Health Act (HITECH) of 2009.

HIPAA is a federal law that establishes national standards for protecting privacy and security of health information and defines specific rights for individuals with respect to their health information. HIPAA requires all covered entities, including healthcare sectors and business associates, to ensure implementation of three forms of safeguard: administrative safeguards in the form of policies and personnel, physical safeguards to their information infrastructure, and technical safeguards to monitor and control intra and

inter-organizational information access in their settings. HIPAA requires each institution to provide training to its employees, volunteers, and anyone else who works in the organization before or upon entering to work at the healthcare institution. It offers the institution flexibility to tailor its training to meet its specific needs. HIPAA training modules address vulnerabilities of electronic health information, how to protect the information, password maintenance, incident reporting, viruses and malicious codes awareness, and institutional privacy policy, among others. Also, HIPAA defines criminal and civil penalties for individuals and organizations that violate the legislation. The civil penalty varies from $100 to $1.5 million, and the maximum criminal penalty is a fine up to $250,000, and imprisonment for up to 10 years. The criminal penalty is clarified by the U.S. Department of Justice (DOJ) and the civil penalty is scrutinized for the amount of fine by Secretary of the Department of Health and Human Services (HHS).

Health Information Technology for Economic and Clinical Health Act (HITECH) is a part of the American Recoveries and Reinvestment Act of 2009. It adds several stipulations to HIPAA such as creating incentives for developing meaningful use of electronic health records, changing the liability and responsibilities of business associates, redefining what a breach is, creating strict notification standards, tightening enforcement, and raising the penalties for a violation.

3.2.2 Thailand

In Thailand, there is no legislation that specifically defines medical data use in a healthcare setting in a manner that HIPAA does in the US. However, several laws, acts, royal decrees, and notices outline and indicate duties and responsibilities of those

involved with electronic business, electronic transactions, electronic information storage, have been established and enacted. Six E-commerce laws involving information security are legislated in the Electronic Transaction Act B.E., 2544 and the Electronic Transaction Act B.E. (Volume 2), B.E. 2551. The six E-commerce laws comprise an electronic transactions bill, electronic signatures law, computer crime law, electronic funds transfer law, data protection law, and universal access law. The electronic transaction bill equates legal status of electronic information to that paper documents in order to increase trust of electronic information from users. This law is similar to the United Nations Commission on International Trade Law, which many countries accept. The electronic signature law certifies that an electronic signature is legal and binding just like a handwritten signature. The electronic signature must be certified by a certification authority in order to ensure data integrity, authentication, and non- repudiation. The computer crime law outlines penalties for offenders or hackers who intend to misuse information technology to commit crimes. The electronic fund transfer law seeks to streamline and increase security of financial transactions. The data protection law seeks to protect personal information privacy, and prevent threats from offenders. The universal access law seeks to permit information technology service to be accessed by everybody. The data protection law is important for medical data misuse protection.

For health information security, the National Health Law B.E. 2550, Section 7indicates that personal health information should be protected, and should not be revealed in situations that may be harmful to the individuals. The revelation of personal medical information should be permitted by the owners. The exception is if an authorized body or the court orders healthcare institutions to reveal it.

Just like healthcare institutions in the US, each hospital in Thailand has its own written policies and notices about medical information privacy and security according to e-commerce laws, and national health law. A hospital information technology policy contains, among other things, the definitions of terms of involved, security policies and objectives, details for organizing of information security, asset management, human resources issues in information security, physical and environmental security, communication and operational management, access control, information systems acquisition, development and maintenance, information security incident management, and business continuity management and compliance. Details and revisions of each topic contained in a hospital's policy are typically announced periodically in a hospital notice.

Just like US healthcare providers complying with HIPAA, and their hospital information security policies, Thai healthcare providers are required to comply with e-commerce laws, national health law, and hospital information security, and privacy policies. Thai healthcare institutions and/or healthcare providers that violate these laws or policies will be penalized by Department of Justice. There are both civil and criminal penalties for those who violate medical information security policies. In addition, if the healthcare providers who commit the crime are licensed healthcare providers such as physicians, nurses, dentists, pharmacists, and medical laboratory technicians who need a professional license for their occupations. The penalty may include licensed withdrawal, or suspension. The licensed withdrawal or suspension is scrutinized by appropriate healthcare providers' professional councils and their corresponding committees. Once the license is withdrawn or suspended, suspended providers cannot legitimately work in their professional career for the period of suspension. When a license is withdrawn or

suspended, the healthcare provider' name will be announced on a professional council notice and/or a professional council website.

3.3   THEORETICAL BAKGROUND

In this section, we review deterrence theory, moral belief, social norms, and Hofstede's cultural values literatures in order to develop the theoretical model and hypotheses.

3.3.1   Deterrence Theory

Deterrence theory is rooted in criminology (Beccaria1963, Bentham 1948, D'Arcy et al 2009). There are two key concepts underlined in this theory; first, specific punishments imposed on offenders will deter or prevent offenders from committing further crimes, and second, the fear of punishment will prevent public from committing the same crimes. In order to make deterrence effective, three components of deterrence are needed: severity, certainty, and celerity of punishment (Hobbes 1950, Beccaria 1963, Bentham 1948).Due to its uncertain effect, celerity is not usually included in most studies involving deterrence. It has been suggested that celerity should be incorporated in severity, or certainty of sanction rather than being evaluated dependently Nagin (2001).

Researchers have applied deterrence theory in studies about human misbehavior study to learn the impact of perceived certainty of punishment and perceived severity of punishments on misconduct. However, in criminology, it has been found that perceived

certainty of punishment and perceived severity of punishment alone is not enough to explain criminals' behaviors. Previous studies found that the deterrence only has a weak explanation on committing crime behaviors and has inconsistent results (Silberman 1976). An example of inconsistent result is found in Title's study on the effects of certainty and severity of punishment on the crime rates (Title 1969). Title reported that certainty of punishment had negative association with the rate of deviances. Contrary to the theory, severity of punishment had positive association with the crime rates (except in the case of homicide).

In order to address the inconsistent results, another study by Tittle & Rowe (1974) suggested considering other variables such as more patterns of differential association, and the implications of labeling theory as part of a more complex explanation of deviant behavior. Factors that they suggested be included in a more detailed model were norms, potential rule breakers, characteristics of the sanctions, and morality. Silberman (1976) added morality and peer involvement as a causal on the degree of criminal involvement in his deterrence model. He found that morality had direct negative effect on criminal involvement while involvement with delinquent peers had direct positive effect on criminal involvement. Finally, he summarized that morality and peer involvement, both separately and jointly can moderate the effect between perceived certainty of sanctions, and perceived severity of punishments on the crime involvement.

In the case of IS misuse, there are inconsistent findings on the relationship between perceived certainty and IS misuse, as well as perceived severity and IS misuse (Straub 1990, Skinner &Fream 1997,Herath& Rao 2009, D'Arcy et al 2009, Hovav &

D'Arcy 2012). In order to address the inconsistent results, D'Arcy & Herath (2011) suggested adding 5 factors in future research: self-control, computer self-efficacy, moral beliefs, employee position, and degree of work that an employee performs from dispersed locations e.g. remote work, office work. D'Arcy et al (2009), and Hovav & D'Arcy (2012) added moral belief in their recent studies, and found that high moral inhibition was associated with perceived certainty of sanctions while low moral inhibition was associated with perceived severity of sanctions, and moral belief can be enhanced through security policies and educational program. Others such as Chan et al (2005), Skinner & Fream (1997), Hollinger (1993), Chang and Lin (2007) and Leach (2003) suggested social norms or peer involvement is related to IS misuse. Chan et al (2005) found that coworker's socialization showed positive relationship to employees' perception of information security climate. A study by Chang and Lin (2007) about the influence of organizational culture on the implementation of information security management and misuse suggested that an appropriate and effective information security management implementation required a favorable organizational culture in addition. Thus, colleagues and managers were important people who shaped the behavior of employees to comply with information security policies. Leach (2003) suggested that correct security behavior from colleagues influences employees' attitudes, and behaviors more than lecturing from the class. On the other hand, Skinner & Fream (1997) and Holliger (1993) found that one of the major predictors of computer crime in students is associating with friends who engaged in this activity. In addition, this study found that student participants learned about pirating software from their family members. Based on the role that morality and social norms have had on misconduct in prior research, we

decided to include these two factors in our deterrence model. A brief review of them follows.

3.3.2 Morality

Moral belief is rooted in psychology. There are three terms that tie together with moral belief– values, ethics, and morals (Oz 2010). Values are core beliefs or desires that guide or motivate the attitude and actions. Ethics represents the branch of philosophy that theoretically determines right from wrong, good from bad, and moral from immoral. It establishes the rules, and standards that govern the moral behaviors of individuals and groups. It is applied to conclude and judge morality of individuals based on rules, standards, code of ethics, and models that help guide decisions. Morals are a collection of judgments, standards, and rules of good conduct in the society. Moral belief guides people toward permissible behaviors with regard to basic values. It determines people's intention especially when they face the situations that challenge their moral belief.

Morality is based on 3 major theories of child moral development; Piaget (1965), Kohlberg (1971), and Brofenbrenner (1970). Kohlberg (1971) and Piaget (1965) focus on intrinsic factors (i.e. individual understandings, and cognitive abilities) that contribute to moral decision making. Bronfenbrenner (1970) lays emphasis on environment contributing to morality. Piaget (1965) suggests that moral understanding starts from primitive understanding. Rules handed down by authority figures are absolute and unbreakable. Later, this rule is modified by cooperation with surrounding people. Consequently, socially-agreed upon guidelines are designed to benefit a group and people realize that making a choice about following the rules should be based on other things

more than fear of negative consequences or desire for individual gain. They finally realize that their decisions could affect everyone in positive or negative directions. Kohlberg (1971) divides the moral development into 3 stages; preconventional, conventional, and postconventional. At the preconventional stage, children learn to comply with the rules governing right, and wrong behaviors. They are well-behaved because of given praise and incentives while avoiding bad behaviors because of punishments. At the conventional stage, people judge the morality of actions by comparing their behaviors to society's views, and expectations. They accept society's conventions concerning right, or wrong. At the postconventional stage, the individuals realize that their own perspectives may take precedence over society's view. Individuals can disobey the rules that are inconsistent with their own principles. Postconventional moralists have their own ethical principles based on their own values of human rights, liberty, and justice. They believe that morality rules are useful but can be changeable under conditions that still maintain general social order, and protect human rights. Brofenbrenner (1970) posits his theory on the influence of environmental forces on individual's moral development. Cultural forces, traditions, religious training, and social reactions influence the individuals' behaviors in terms of appreciation of right and wrong, proper behavior, fairness, and appreciation of outcomes associated with particular behaviors they might contemplate engaging in.

Guilt and shame are terms that play a fundamental role in morality (Eisenberg 2000). Guilt is viewed as a superego response to one's own unacceptable impulses. In other words, guilt arouses a painful feeling of regret when the individual actually causes, anticipates causing, or is associated with an aversive event (Furguson & Stegge 1998). A

guilty actor accepts responsibility for a behavior that violates internalized standards or causes another's distress. He or she desires to make amends, to confess, to apologize, and to punish him or herself rather than seek avoidance (Furguson & Stegge 1998). Shame is defined as a helpless emotion aroused by self-related aversive events (Furguson & Stegge 1998). An ashamed person focuses more on devaluing or condemning the entire self, experiencing the self as fundamentally flawed, feeling self-conscious about the visibility of one's actions, fearing scorn, and thus avoids or hides from others (Furguson & Stegge 1998). Guilt and shame often co-occur. However, adults often report that shame experiences are more painful than guilt and shame is associated with a preoccupation with other's opinions (Eisenberg 2000). When the individual faces a moral challenge situation, guilt and shame are aroused so that the individual calculates the benefits and risks of committing the behaviors (Eisenberg 2000). Thus, moral belief that aggravates guilt and shame while pending to commit misuse behaviors is important and has the direct impact on misconduct.

3.3.3 Social Norms

The concept of social norms is quite pervasive and has been employed in anthropology (Geertz 1973), sociology (Durkheim 1950, Parsons 1951 Coleman 1990), economy (Akerlof 1976), and psychology (Bandura 1963, Skinner 1963). "Social learning theory" is another similar term used by psychologists (Bandura 1963, Skinner 1963). Social learning theory posits that human behavior is a learning process through observation, interaction, and reinforcement from surrounding people including family members, friends, colleagues, residents, etc. People tend to conform, and adopt norm

patterns in order to meet group expectation (Bandura 1963, Skinner 1963). A norm is a fundamental matter that creates conformity that allows for people to become socialized to the culture in which they live and allows social scientists to understand the variation of human behaviors (Campbell 1964). Group norms reflect attitudes, expectations, and behaviors. Group norms do not just characterize the groups but regulate group members' actions to perpetuate the collective norm. The strong tendency of people to conform to group patterns and expectations is consistently documented in many laboratory experiments, social surveys, and participant observation of cultural contexts (Silberman 1976, Skinner & Fream 1997, Perkins 2002, Chan et al 2005). Social psychologists add that people tend to adopt groups' attitudes, and act in accordance with groups' expectations and groups' behaviors based on affiliation needs, and social comparison processes (Festinger 1954); social pressures toward group conformity (Silberman 1976, Skinner & Fream 1997, Chan et al 2005); and the formation and acquisition of reference group norms (Newcomb 1943, Skinner & Fream 1997,Perkins 2002). An example of social norms influencing an individual's behaviors is reported in a study by Perkins (2002), where he studied alcohol consumption in college students. He found that surrounding people such as parents, resident advisers, faculties, and peers influenced misperception of alcohol drinking in college students, which subsequently had an impact to the amount of alcohol consumption of the students.

Deviance or nonconformity to a set of norms may result in being considered outcasts of society. In psychology and sociology,(Durkheim 1950, Bandura 1963, Skinner 1963)it says that an individual who disobeys group norms runs the risk of turning into the institutionalized deviant. The deviant behaviors for their failure to adhere to

norms are judged by other group members. Group members might engage the individual conversation or explicate to the deviant about the group expectation on the deviant's behavior. However, the deviant person may receive some punishment from the group, ranging from the minor such as ridicule for a non-conformity behavior to the severe including criticism, ostracism, and boycott (Applebaum et al 2009). If the individual is outcast, he or she will be considered superficially and credited very lowly by the group (Applebaum et al 2009).

In criminology, three concepts of social norms are used for explaining the potential effect that the social surrounding can have on an individual, with regard to engaging in criminal behaviors. They are differential association, differential reinforcement, and imitation. Differential association is a process that proposes that individuals learn values, attitudes, techniques, and motives for a criminal behavior through an interaction with others. It posits that people will engage in more criminal and deviant behaviors, and have less conformity to the norm when they differentially associate with others who commit criminal behavior and favorite. Differential reinforcement refers to the balance of expected reward and punishment resulting from criminal behaviors. It is posits that the reinforced delinquent from referents determine the extent and nature of an individual's misconduct. Imitation refers to an engagement in behavior after observing similar behaviors by others. Thus, social norms influence the perception of individuals who are in the same community and subsequently affect their intention and behaviors. In order to avoid being separated from the group, an individual conforms to the group norm regardless of whether the norm is good or bad.

Although social norms can result in positive and negative association with misbehaviors, in our study context, we focused on misbehaviors in information security environment. Thus, social norms in our context will have a negative effect on misuse behaviors.

3.3.4 National Cultural Values& Espoused Cultural Values

As our study is based our comparison of two cultures (Thai and American), cultural values are important factors that need to be considered in terms of its interaction or mediation effect to the deterrence. Cultural values are reviewed in this section. Culture has been defined using a number of conceptualizations, and dimensions. One comprehensive definition is from Hofstede (1997). He defines culture as a cumulative deposit of knowledge, experience, beliefs, values, attitudes, meanings, hierarchies, religion, notions of time, roles, spatial relations, concepts of the universe and material objects, and possessions acquired by a group of people in the course of generations through individual and group striving. Jermier et al (1991) simplify the concept of culture tacit and explicit components of culture where tacit aspects like assumptions are ideational, and explicit artifacts of culture, e.g., norms and practices, are considered material.

3.3.4.1 Hofstede's Cultural Values

Even though national culture has been defined in many ways, Hofstede's definition is "the collective programming of the mind that distinguishes members of one human group from another" (Hofstede 1984) is the one that is most often used. For

studying national cultural values, Hofstede conducted surveys with over 120,000

participants from over 50 countries (Hofstede et al 1991, Hofstede 1997). His work on

national cultural has been widely used in several research fields, particularly in cross-

cultural psychology, international management, and cross-cultural communication

(Hofstede et al 1991). Based on his survey, Hofstede defined his first theory in four

dimensions (Hofstede et al 1991) including; 1) Individualism vs. Collectivism: focuses on

the degree that the society reinforces individual or collective achievement and

interpersonal relationships; 2) Power Distance: focuses on the degree of equality, or

inequality, between people in the country's society; 3)Masculinity vs. Femininity: focuses

on the degree the society reinforces, or does not reinforce, the traditional masculine work

role model of male achievement, control, and power; and 4) Uncertainty Avoidance:

focuses on the level of intolerance for uncertainty and ambiguity within the society. In

subsequent studies (Hofstede 1997, Hofstede& Bond 1988, Hofstede2010), he added two

more dimensions – long term orientation, and indulgence.   ; 5) Long Term vs. Short

Term Orientation focuses on the degree the society embraces or does not embrace

"traditional" values, deferred gratification, and long-term commitments. This dimension

is influenced by Confucianism, and posits that long term oriented societies focus on the

future where people are willing to delay short-term material or social success or even

short-term emotional gratification in order to prepare for the future. Values related to

long terms orientation are persistence, perseverance, ordering relationships by status,

saving and being able to adapt and having a sense of shame. On the other hand, short

term oriented societies, which tends to characterize Western culture more than Asian

culture, focus on the present or the past and consider these two conditions are more

important than the future. People in these societies care more about immediate gratification than long-term fulfillment. Values related to short term orientation are tradition, steadiness, face saving, current social hierarchy, reciprocation, and fulfillment of social obligations. Indulgence vs. self-restraint: focuses on the gratification versus control of basic human desires related to enjoying life (Hofstede 2010). Hofstede's definition of national culture (Hofstede et al 1991) implies that culture is created based on collective values. Thus members from the same culture are interpreted as being similar in the way that they prefer to be viewed by the world (Preston et al 2006).

Although there are 6 dimensions that relate to cultural values, in this study we excluded masculinity vs. femininity and indulgence vs. self-restraint. Masculinity vs. femininity tends to reflect the degree to which a culture emphasizes gender inequalities, competitiveness, and achievement (masculine values) versus quality of life, and personal relationship (feminine values) is not closely related to the IS security domain. In addition, there is no strong theoretical assumption for its influence on IS misuse. Indulgence vs. self-restraint is excluded because the notion of gratification and hedonism is not associated with medical data misuse. In addition, this dimension has just recently been proposed, and has been used comparatively little in a research context, and less so in the IS misuse context. Therefore, only four Hofetede's cultural values and their corresponding scores for Thais and Americans, used in our model are provided on Table 1.The explanation for each score is provided under Table 3.1.

Table 3.1: Hostede's Cultural Dimensions

Dimension of National Culture	Definition Summary	Thai	US
Power Distance (PD)	Degree to which large differentials of power and inequality are accepted as normal. Power distance will condition the extent to which the employee accepts that a superior has more power.	64	40
Individualism vs. Collectivism (IDV)	Degree to which culture emphasizes on individual's needs as opposed to the group needs and member prefers to act as an individual rather than as a member of a group.	20	91
Uncertainty Avoidance (UAI)	It is the level of ambiguity accepted by the culture as evidenced by rule obedience, ritual behavior, labor mobility and degree of comfort with ambiguity.	64	46
Long Term vs. Short Term Orientation (LTO)	Degree to which the culture embraces long-term values and traditions as opposed to personal stability and respect to traditions.	56	29

Source: Hofstede, G. (2011) cites reference. From http://geert-hofstede.com

Each score provides a basis for distinguishing between individuals from different cultures. In the case of power distance, Thailand has a score of 64. This means that Thailand is a society in which inequalities are accepted; a strict chain of command and protocol are observed. Each rank has its privileges and employees show loyalty, respect and deference for their superiors in return for protection and guidance. This may lead to paternalistic management practices. On the other hand, US has a score of 40, which suggests that Americans believe in liberty. In US organizations, hierarchy is established for convenience, superiors are always accessible, and managers rely on individual employees, and teams for their expertise. Both managers and employees are expected to work together and information is shared equally between them.

For individualism, Thailand has a score of 20. This suggests that Thailand is a highly collectivist country. This indicates close long-term commitment to the member group and loyalty to the in-group where everyone takes responsibility for fellow members of their group. The US score of 91 that the US culture is highly individualistic. In US

organizations, employees are expected to be self-reliant, and display initiative in order to be hired or promoted,

In the case of uncertainty avoidance, Thailand has a score of64. This suggests that Thai society does not readily accept change, and that it is risk averse. The ultimate goal of this population is to control everything in order to eliminate, or avoid the unexpected. Thus, in order to minimize or reduce this level of uncertainty, strict rules, laws, policies, and regulations are adopted and implemented. On the other hand, the score for US is 46, which indicates that Americans are more likely to accept uncertainty that may be caused by applying new ideas and innovative products in their organizations. Also, they are enthusiastically willing to try something new or different,

For the case of long term orientation, Thailand has a score of LTO =65. This would suggest that Thais prefer persistence, ordering relationships, thrift and avoiding sense of shame. Amongst the values, persistence and having a sense of moderation are dominant. Saving face is a key protocol for Thais to avoid confrontational behaviors. In the case of the US, this score is 29, indicating that the US is a short-term oriented culture. Thus, businesses measure their performance on a short-term basis, with profit, and loss statements being issued on a quarterly basis. The frequent evaluation drives individuals to strive for quick return results.

The scores reveal that the US and Thai cultures are different on these four dimensions. Hofstede (1994) has cautioned against using country scores on these dimensions to predict individual behavior, which are considered to be theoretically distinct (Srite & Karahanna 2006). Although Hofstede's cultural values intended to

describe cultural values at a national level rather than an individual level, Ford et al (2003) suggested that this theory can be appropriately applied and tested with the individual as the unit of analysis. Ford et al (2003) noted that the national cultural values can be used to compare cultural differences at the individual level by applying Hofstede's cultural dimensions as moderating variables that influence the weighting of the predictor variables. Thus, to test Hofstede's cultural values at an individual level, a study by Srite & Karahanna (2006) applied Hofstede's cultural values as espoused cultural values and used them as moderators to test the individual acceptances of the technology model. In our study, we follow Fort et al (2003) and Strite & Karahanna (2006). We apply Hofstede's cultural dimensions as espoused values and used them as moderators examining the individual level of medical data misuse.

In studies involving comparison between Asian and Western culture, there are two more cultural values that may be relevant – Confucianism and face saving. Hofested's (1997) and Hofstede& Bond (1988) became interested in these two constructs when conducting a study among Chinese students in 23 countries. At the end of this study, Hofstede added a new fifth dimension to his national cultural values; long term orientation (LTO), which was initially called Confucian dynamism (Hofstede& Bond 1988). A brief review on Confucianism and face saving is included in the following sections.

3.3.4.2 Confucianism

Confucianism focuses on commitment to harmonious operation, welfare of the society by keeping under paternalism, and kinship (Fan 1995). The five aspects of

Confucian values are hierarchy and harmony; group orientation; relationships; face; and time orientation. Hierarchy and harmony require that each person behaves according to rank and social status to achieve social harmony. Social hierarchy and relations of subordination and superiority are considered natural and proper structures. Group orientation relates to the kinship and close personal relationships of individuals in a group. Individuals exist for the benefit of the group. Group pressure is applied to ensure conformity through eliciting shame (losing face) and conflict. Conflict is generally handled through internal meditation rather than an external legal system. Relationships refer to the concept of drawing on connections in order to secure favors in personal relations (Lau 1997). It contains implicit mutual obligation, assurance, and understanding, and governs Chinese attitudes toward long-term social relationships. Face refers to showing respect for one's social status. To maintain face means to stay trustworthy and to honor obligations in one's social interactions. It is perhaps more important to give face to others than to protect one's own. Time orientation stems from the Confucian belief that time is eternal, flexible, and repeatable regardless of how much present-day businesses want to press against it.

Confucianism influences Thai culture in many ways. Thai people respect rank of social status, conform to the social norms, respect relationships, and believe that time is eternal. However, face in the Thai context is different from the Chinese context. Instead of showing respect for one's social status, in the Thai context face means avoiding or protecting oneself or others from loss of face for dignity or prestige. This is more attributable in avoiding direct and strong criticism that might embarrass others (Roongrerngsuke 2010).

In Western countries, Confucian theory is not applied at all in an organizational context. Hovav & D'Arcy (2012) contended in their work that the influence of Confucianism in terms of harmony, relational hierarchy, and traditional conservatism is infused in non-western society. Srite & Karahanna (2006) indicate that the theory is applicable and compatible only in the Asian value system. As our study is a cross cultural study about medical data misuse in healthcare settings between Thai and the US, we elected to use Confucianism in our study. However, we applied this theory in the form of Hofstede's fifth dimension of culture since LTO has already contained the concepts of Confucianism, and face saving in its measures (Hofstede &Bond 1988).

3.3.4.3 Face saving

The concept of face has significant influence on human behavior in Asian societies. Anecdotal evidence suggests that face works as a powerful social force when Asian managers make decisions, and choose a course of action (Yang 1945, Ho 1976). A review by Kim& Nam (1998) covered several definitions for face, including a positive social value (Gaffman 1955), public self-image (Brown & Levinson 1987), and honor and prestige (Ho 1976). Causes of losing face range from failing to fulfill social expectations (Modigliani 1968), violation of the rules (Edelmann 1985), does not treat others respectfully (Ho 1976), and failure to meet social roles (Ho 1976). Losing face can lead to creating a more unfavorable self-image (Modigliani 1968), and may involve complying with the others' requests in order to gain face back, or seeking more approval from others. People engage in face-saving behavior are more active than when they are considered incompetent (Garland &Brown 1972),

Kim & Nam (1998) also reported about the differences of face saving between Western and non-Western cultures. In Asian culture, the context of face is not an internal but an external attribute such as social status, which constitutes the basis for his/her face. Asians care more about social hierarchy interactions than Westerners; 2) context of face is interdependent. Each participant is responsible for saving both his/her own face and the other's face. In other words, Asians experience the loss of face not only by their misconduct but also by the misconduct of their close associates. Westerns think the misconduct is an individual responsibility; 3) Asians often forego immediate material gains to save face while westerners think this behavior is irrational; 4) the bureaucratic control for opportunistic behaviors which are coercive and direct, often works with westerners, but it could be dysfunctional with Asian employees if it is used without concern for face and; 5) Asian people use more indirect face work than western (Cocroft & Ting 1994). This means that the Asian people will reduce the conflict by avoiding confrontation with others in the situation that leads to face-losing. For Thai culture face defines an ego (Roongrerngsuke 2010). Therefore, losing face may lead to psychological trauma, negative consequences, and revenge. In our study, since LTO measured items also contain the concepts of face saving, we examined the concept of face-saving in the form of long term orientation –Hofstede's fifth dimension of culture.

3.3.5 Applying National Cultural Values

We elected to examine Hofstede's cultural dimensions at both the national level and individual level in this study since they both have an influence in the IS misuse context (Hovav & D'Archy 2012). Using only national level values may lead to

imprecision in explaining individuals' behaviors (Straub et al 2002).The arguments for using national level values are many. Previous studies have reported that organizations are institutions that exhibit the values and norms of their societies where employees are requested to comply with this norm (Zucker 1997).Shaw (1990) argued that the dominant national cultural values are important and influence the individual's cognitive map, which are reflected in the social systems, and institutions within a culture. In a similar manner, Tosi & Greckhammer (2004) posited that the value of systems of nation' population directly and indirectly influences the structure and functioning of organizations. Kim (2008) contended that organizational culture affects individuals in that culture as a whole. The following arguments have been used to measure culture at the individual level. Straub (2002) argued that culture is manifested itself through the individual, and then be aggregated to the collective. Therefore, the effect of culture is depended on the extent to which the individual subscribes to cultural values (Srite & Karahanna 2006). Robinson (2009) contended that it should be noted that individuals vary greatly in the degree in which they espouse as they have their own specialized cultures and mind sets. Thus to generalize cultural characteristics across an entire nation of people may lead to "ecological fallacy", which means the stereotypes are substituted for individualistic and idiosyncratic traits.

From the previous studies about cultural values, there are two terms that relate to cultural values that need to be clarified– espoused values and enacted values (Simoms2002). Espoused values are the values and norms that are preferred by an organization. These values are created by the organization as a blueprint that encourages the employees to adopt and comply with. In other words, employees also wish others to

believe that they hold these values and these values reflect what their attitudes are. Enacted values are the values that individuals actually hold and act; especially those decisions of which others are not aware. Therefore, espoused values are public values since the employees want people to see them. Enacted values are private values since people may conceal them. It is hard to examine enacted values since employees may hide what they believe or practice in actual situations. In this study, espoused values, the values that reflect individuals' attitudes, and they wish others to believe which they hold, are examined.

3.3.5.1 Applying National Cultural Value in Extended General Deterrence Model

Prior studies have indicated that Asian cultures are characterized by a set of values that includes obedience to authority, intense allegiance to groups, and a submergence of individual identity in collective identity (Englehart 2000). According to Hofstede (1980, 1991) and Confucianism (Fan 1995), the organization is more important than personal needs or desires in the case of Asian employees. The organizational goals should have priority over their personal goals, and that the organization must in turn repay its employee's loyalty by affording a certain protection, and a sense of identity. In contrast, in Western culture, people are influenced by individualism. They are chiefly concerned with protecting individual autonomy against obligations imposed by social institutions (Hofstede 1990).

Applying the deterrence, and sanction perception, it is predicted that Asian employees are more likely to be afraid of being discovered rather than being punished. This might result from losing face (Hwang et al 2003, Kim & Nam 1998,

Roongrerngsuke 2010). The sense of embarrassment of Asian people is expected to set people right, and discourage them from engaging in criminal behavior. Western employees are less influenced by collectivism and they have less concern about group's imposition. The concept of punishment for them is based more on personal cost of committing crime that leads them to calculate the loss and gain for the consequences. Thus a severe punishment is expected to prevent Westerners from committing crime (Fisse, B., & Braithwaite, J. 1986).

In the case of morality, Asian subjects are more concerned with the issues of interpersonal harmony, concern for others, welfare and mutual benevolence, and harmony (Bedford & Hwang 2003). In contrast, Western subjects were more concerned with moral rules and issue of justice and gave priority to formal moral obligation (Bersoff & Miller 1993). Westerners and Asians have different concerns with respect to moral issues.

For social norms, Asian subjects are characterized by long term orientation and power distance (Hofstede 1980, 1991). They tend to avoid conflict with others and obey authorities in order to maintain social harmony. In contrast, western subjects are individualistic. They are self-reliance and concerned about self-interest (Hofstede 1980) rather than others. They pay attention to evaluating one's self in hierarchical relationships before making decisions, and forming judgments. They are less likely to sacrifice their personal goals for the organization goals, and are less willing to submit to authority and regulations imposed by organizations. Thus, Asian subjects are more agreeable to comply with social norms.

The espoused national cultural values that indicate individual difference and moderate relationships in the extended general deterrence model (GDT) are reviewed in the following section. Also, the specific interactions between espoused cultural values and deterrence, moral belief, and social norms are indicated in the extended GDT model.

3.3.5.2 Applying Espoused National Cultural Values as Moderators

Based on the prior studies about espoused national cultural values, the interactions that have been reported are reviewed in this section. For power distance (PD), Hofstede (1984) had indicated that individuals with high espoused power distance cultural values will be more concerned about complying with their superiors' opinions, and will fear to disagree with them. Further, these individuals are likely to refer decisions to the judgment of their superiors (Hofstede 1998) and comply with whatever this decision may be. Thus, due to this compliance effect, it is expected that social norms (SN) will be more important determinants of intended behavior for individuals with higher espoused power distance values than for individuals with lower espoused power distance values (Srite & Karahanna 2006). For individualism (IDV), a study by Magnus et al. (2002) and Chapman& Lupton (2004) found that collectivist individuals are expected to tolerate more cheating or misbehaviors as helping others who are misbehavers or even conceal their faults. Therefore they seek perceived certainty of sanction (PC) for ethical decision making. This suggests the individual with low IDV needs PC to control their misconduct. Further, a review by Fisse & Braithwaite (1986) that applied individualism and collectivism in a corporate crime in organizations reported the association between individualism and deterrence. Deterrent punishment implies the need for sufficient

individual liability which impels corporate responsibility and reduces the number of convictions for corporate crime in an organization. A review by Pan (2008) contended that individualism focuses on the fairness of outcome distribution and sanctions rather than the fairness of decision making. Individualism focuses on equity, autonomy, and self-benefit. Hence sanctions that are severe can make individualist calculate risks and benefits of committing it. An individual with high IDV will seek to establish the perceived severity of sanctions (PS) for ethical decisions.

For uncertainty avoidance (UAI), a study by Salter et al (2001) found an association between uncertainty avoidance (UAI) and the certainty of sanction (PC), such that individuals within more uncertainty avoidance are more likely to cheat or misbehave and will seek the certainty of sanction as a guide to making decisions of an ethical nature. This means that individual with high UAI needs PC to control their misconduct.

In the case of long term orientation (LTO), Hofstede & Bond (1988) found that individuals with high long term orientation tend to have senses associated with the following values: persistence, ordering relationships by status, thrift, and having a sense of shame, while people with low scores tend to value the relative importance of personal steadiness and stability, saving face, respect for tradition, and reciprocation of greetings, favors, and gifts. As a result, the effect on compliance for the individual with a long term orientation is expected to be associated with Confucian while the individuals who value short term orientation is expected to be associated with saving face. Hofstede & Bond (1988) found that individuals with high Confucian tend to be more compliant to social norms. Park et al (2005) contended that Confucian affects social relationships, and face-

saving affects to criterion of ethical judgments of behaviors. Thus, individuals with high LTO tend to comply with social norm whereas individuals with low LTO tend to comply with moral belief.

3.4 RESEARCH HYPOTHESES

The research model for this study is presented in Figure 3.1. It is based on work done on deterrence by D'Arcy et.al (2009), and Havov & D'Arcy (2012).Based on prior literature review, two antecedents including social norms and moral belief are added as informal sanctions. Espoused national cultural values derived from Hofstede's national cultural values are also integrated into extended general deterrence model. In this study, we are interested in both a national cultural level that affects healthcare providers' misuse intention, and an individual level (espoused cultural values) that affects those healthcare providers who hold the espoused same values. Individual constructs are described, and the development of the hypotheses is discussed.
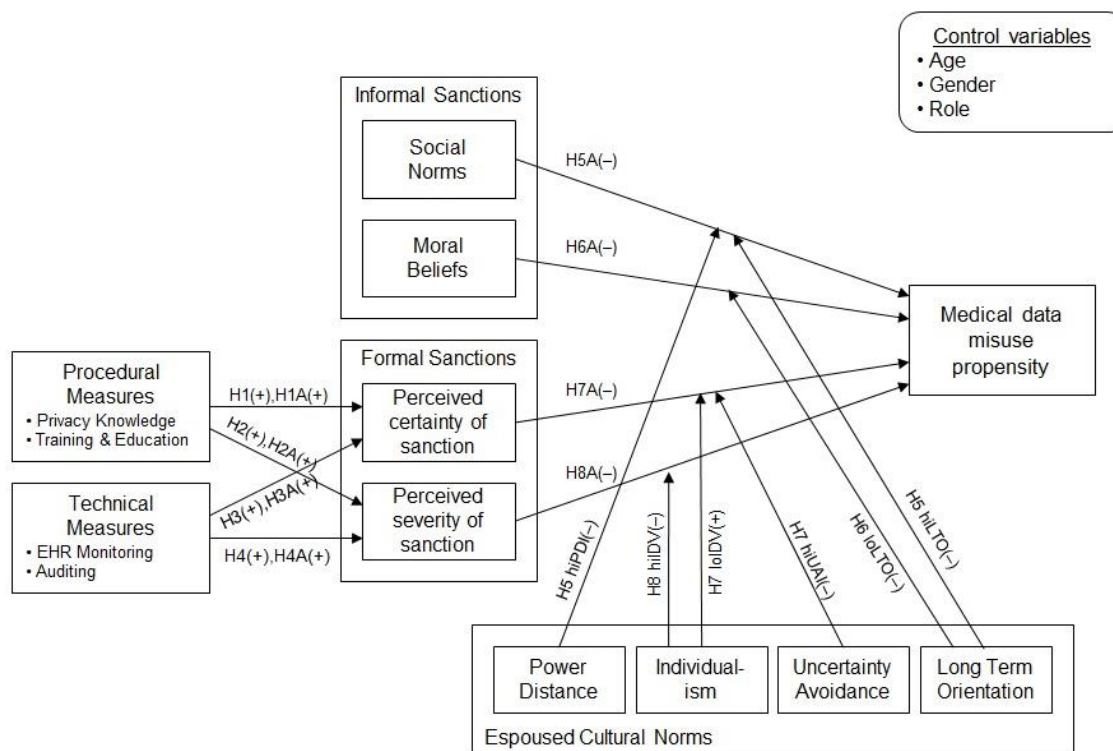
Figure 3.1: Research Model and Hypotheses

3.4.1 Medical Data Misuse Propensity

Medical data misuse propensity is defined as an individual propensity to perform a behavior that violates the hospital information privacy and security policy. The domain of medical data misuse is quite varied, ranging from behaviors that are unethical and/or inappropriate (e.g. personal use of smartphone to take a copy of patient health records) and to those that are illegal (e.g. selling protected patient health records to insurance company). However, in this study, we focused the scenarios that represent fairly common situations that are plausible, and are representative of typical medical data misuse that are in effect data breaches for the institution. We do not address the pathological and esoteric cases, since they are clearly egregious and will result in unanimity of agreement

about them. Four medical data misuse behaviors are employed: colleague's account usage, medical data download to personal devices, unauthorized access, and medical data sharing in social media application.

3.4.2 Security Countermeasures

3.4.2.1 Procedural Countermeasures

Procedural countermeasures include knowledge of privacy rules for medical data, hospital security polices (guidelines for proper, and improper use of medical data, and hospital IS resources), and security training. From the deterrence perspective, procedural countermeasures rely on the same underlying mechanism as societal laws which constituting misconduct, and defining punishment for such behavior (Hovav&D'Arcy 2012). We contend that the impact of procedural countermeasures depends on individuals' perception, and influence from national culture. We expect that healthcare providers who know the hospital information privacy and security policy well, and have attended the hospital privacy and security training, will understand acceptable use and unacceptable use policies as well as the certainty and severity of sanctions so that they conduct less careless behaviors and refrain from committing such behaviors. Hence we hypothesized that:

H1: Knowledge of procedural countermeasures is positively associated with perceived certainty of sanctions.

H2: Knowledge of procedural countermeasures is positively associated with perceived severity of sanctions.

Organizational culture has an effect on all individuals in that culture as a whole (Kim 2008). When adapted to the healthcare context, it follows that healthcare providers from the same culture will have similar responses to the sanctions. A study by Hovav& D'Arcy (2012) reported that in Asian culture, losing face is a stronger deterrent to illicit behavior than a tangible punishment. Applying this to our study, we expect that procedural countermeasures would have a strong impact on perceived certainty for Thai healthcare providers due to losing face when discovered. On the other hand, in an individualist culture like the US, punishment in terms of the individual's cost rather than shame or embarrassment are more likely to influence the individual. Therefore we expect that procedural countermeasures would have a stronger impact on perceived severity for US healthcare providers. Hence, we hypothesize that:

H1A: Procedural measures will have a stronger positive effect on perceived certainty of sanctions for Thai healthcare providers than for the US healthcare providers.

H2A: Procedural measures will have a stronger positive effect on perceived severity of sanctions for the US healthcare providers than for Thai healthcare providers.

3.4.2.2   Technical Countermeasures

Technical measures include tracking or randomly checking employee's usage activities, and performing regular audits. Studies about deterrence (Straub 1990, Straub & Nance 1990, Straub &Welke 1998, Lee & Lee 2002, D'Arcy et al 2009) showed that monitoring and surveillance activities increase perceived sanctions from illicit behavior.

Therefore, people who understand a monitoring system and negative consequences of being caught by this system tend to have lower propensity to misuse medical data. Thus, we hypothesized that:

H3: Knowledge of technical countermeasures is positively associated with perceived certainty of sanctions.

H4: Knowledge of technical countermeasures is positively associated with perceived severity of sanctions.

Considering the cultural effect on technical countermeasures, a study by Khaled et al (2007) found that a collectivist society has less privacy concerns, and also cares less about the impacts of monitoring of individuals. Individuals may not recognize where and how they are watched and tracked, or who is monitoring them. Therefore, they are careless about the technical procedures. On the other hand, individuals from US culture are more likely to understand the process of how they are monitored while they are using the secured information, and the consequences of being caught by the monitoring procedure. This assumption is consistent with Hovav & D'Arcy (2012) that found that US employees were more aware of technical countermeasures for IS misuse more than Korean employees. Thus we hypothesized that;

H3A: Technical measures will have a stronger positive effect on perceived certainty of sanctions for the US healthcare providers than for Thai healthcare providers.

H4A: Technical measures will have a stronger positive effect on perceived severity of sanctions for the US healthcare providers than for Thai healthcare providers.

3.4.3 Espoused Cultural Values

Since cultural values do not have the identical manifestation for each individual in a national culture, and the application of deterrence is at the individual level, it becomes important to assess to what degree an individual subscribes to that particular culture. Instead, the determination of an individual's intention and behavior is dependent on the cultural value that he/she espouses. This section addressed how espoused cultural values are employed as moderators in our model.

Espoused cultural values are corporate values and morals that are important to an organization. They are the values that individuals or organizations are committed to, in some way, but have not necessarily attained. They contribute to the development of normal standards of the organization. In addition, espoused values focus on an individual's values or an organization's values difference rather than assuming the homogeneity of people or organizations. A study by Srite & Karahanna (2006) indicated that the relationships posited by technology acceptance may function differently in each individual when considering espoused cultural values, even if these individuals are from the same culture.

3.4.3.1 Espoused Cultural Values and Social Norms

Social norms reflect attitudes, expectations and behaviors while also regulating group members' actions to perpetuate the collective norm. Research in cultural contexts has shown patterns of conformity of individuals who are from the same group, and concluded that individuals who conform to social norms tend to follow regulations, and

rules of an organization more strictly than individuals who do not conform to social norms(Silberman 1976, Skinner & Fream 1997, Chan et al 2005). Based on espoused values, individuals with high LTO tend to follow Confucian more than individuals with low LTO. Thus individuals with high LTO will strictly conform to social norms (as Confucian influences and have a positive relationship with social norms (D'Arcy et al 2009, Hovav & D'Arcy 2012 and Park et al 2005) and have low medical misuse propensity. Further, individuals who espouse high power distance (PD) strictly follow social norms because they trust authorities and tend to comply with orders or rules that made by these people more than individuals who espoused low PD (Hofstede 1984, Hofstede 1988). Thus, we hypothesized that;

H5: High LTO/high PDI moderates the negative relationship between social norms, and medical data misuse, and the negative relationship between social norms and medical data misuse will be stronger in the individuals with high LTO/ high PDI.

When examining across cultures, Asian individuals are more likely to conform to the group norms in order to avoid conflict among friends, colleagues and superiors, and save others' and their faces (Garland & Brown 1972, Ho 1976, Roongrerngsuke 2010). Western culture tends to focus on individualism (Hofstede 1984). Thus, in this context, western individuals comply with the hospital countermeasures because they calculate the costs and benefits which are the consequence of committing such behavior that may occur to them rather than comply because of the social norm force. Therefore, in this context, Asian people are more likely to be affected by social norms. Therefore we hypothesize that:

H5A: Social norms will have stronger negative effect on medical data misuse for Thai healthcare providers than for the US healthcare providers.

3.4.3.2 Espoused Cultural Values and Moral Belief

Moral belief ascribes to the theory that an individual perceives some behaviors to be morally offensive. It is regarded as an intangible cost that encompasses the threat of feelings of guilt or shame for performing a morally wrong act. Based on truism, individuals who practice their lives morally tend to engage in less immoral activities, compared to people who are immoral. Espoused cultural values suggest that individuals with low LTO or in other words, high short term orientation care for face saving than people with high LTO. Thus individuals with low LTO will have high morality (Park et al 2005) and have low medical data misuse propensity. Hence, we hypothesize that;

H6: Low LTO moderates the negative relationship between morality and medical data misuse, and the negative relationship between morality and medical data misuse will be stronger in the individual with low LTO.

Asian culture is a culture that has high influence of Confucianism. In Confucianism, morality is the standard for proper behaviors which people obey because they view that the obedience will create the harmony and peaceful in their community (Fan 1995). Western people view morality as an act that achieves benefits or reduces risks that affect individuals rather than the impacts that have on the harmony of the group. In this medical data misuse context which security countermeasures are rules, and regulations that aim to create compliance among employees in order to achieve group

harmony, Asian people are more likely to comply with this morality. Thus in this context, it is assumed that Asian people are more likely to have high morality than Western individuals. Thus we hypothesize that

H6A: Moral belief will have stronger negative effect on medical data misuse for Thai healthcare providers than for the US healthcare providers.

3.4.3.3 Espoused Cultural Values and Perceived Certainty of Sanction

In the deterrence context, perceived certainty of sanction refers to the chance of being discovered after committing a crime (Title 1980). Previous studies by Bedau (1983), Kleck (1988), Shavell (1992), Seigel (2005) found that perceived certainty of sanction have negative relationship with misconduct (Title 1980, Straub 1990, Nagin & Pogarsky 2001). In terms of espoused cultural values, a study by Salter et al (2011) found that the relationship between perceived certainty and intention to misuse are moderated by UAI and IDV. For UAI, individuals who have high UAI tend to have higher cheating risk, and require certainty of sanctions for encountering their ethical judgment. Individuals with low IDV tend to conceal others' faults or even coalition with others who misbehave. In addition, they tend to conceal their faults in order to keep positive group images. Therefore, those people need certainty of sanctions for encountering their misconduct. Thus, we hypothesize that

H7: High UAI/ low IDV moderate the negative relationship between perceived certainty of sanction and medical data misuse, and the negative relationship between perceived

certainty of sanction and medical data misuse will be stronger in the individual with high UAI/ low IDV.

When looking across cultures, Hovav & D'Arcy (2012) found that a deterrence that occurs in Asian culture was the effect of losing face which seldom matters in the US. The threat of embarrassment from misuse discovery was salient among Korean users while there was no obvious relationship between the severity of punishment and embarrassment. In the US culture, the concept of punishment is based more on the personal cost of committing a crime. Hence, we hypothesize that:

H7A: Perceived certainty of sanctions will have stronger negative association with medical information misuse for Thai healthcare providers than for the US healthcare provider.

3.4.3.4 Espoused Cultural Values and Perceived Severity of Sanction

Perceived severity of sanctions refers to the chance of being punished severely after a crime is discovered (Title 1980). Previous studies by D'Arcy (2009) and Herath & Rao (2009) found that perceived severity of sanctions has negative association with IS misuse. In the context of espoused cultural values, a review by Pan (2008) found that individuals with high IDV tend to perceive punishment as a personal cost of crime committing. Hence the sanctions that are severe enough can make the individuals with high IDV calculate risks and benefits of committing it and result in avoiding such behaviors. Thus, we hypothesize that

H8: High IDV moderates the negative relationship between perceived severity of sanction, and medical data misuse, and the negative relationship between perceived severity to sanction and medical data misuse will be stronger in the individual with high IDV.

When examining across different cultures, studies have found that no obvious relationship between the severity of punishment and embarrassment for Asian cultures. In the US culture, individuals are afraid to pay for committing crime rather than losing face so that the effect of severity of sanctions on IS misuse intention among US users was more distinct than the effect of certainty of sanctions on IS misuse intention. Hence we hypothesize that:

H8A: Perceived severity of sanctions will have stronger negative association with medical information misuse for the US healthcare providers than for Thai healthcare providers.

3.4.4   Control Variables

Gender and age are suggested as additional variables because of their potential influence on IS misuse intention. Roles in healthcare institutions are different so that HIPAA indicates the training to be tailored for each job's needs. Thus we believe that different roles predict various forms of medical data misuse as healthcare providers may receive specific training regarding their jobs, which consequently has potential influence on medical data misuse propensity. In summary, we consider role, gender, and age as control variables that account for potential differences in medical data misuse among healthcare providers.

3.5 RESEARCH METHODOLOGY

This section describes the research methodology involved in this study, including the development of scales and instruments, and the sampling procedure.

3.5.1 Measurement

Our study used English and Thai versions of the survey instrument to test the relationships implied by the research model and the research hypotheses. The survey relies on past measurements for some of the constructs. The survey contains seven main constructs, and four interaction constructs. The first part of the survey is designed to capture healthcare providers' perceptions of the certainty (PC), and severity (PS) of institutional sanctions as formal sanctions for engaging in medical data misuse (INT); and the influence of moral beliefs (MB), and social norms (SN) as informal sanctions for engaging in medical data misuse (INT). The second part of the survey measures healthcare providers' awareness of procedural countermeasures (PCM) including hospital information security policies, and information security knowledge and training, and technical countermeasures (TCM) including Electronic Health Records (EHR) monitoring, and auditing. The third part of the survey captured espoused national cultural values, including power distance (PD), individualism/collectivism (IDV), uncertainty avoidance (UAI) and long term orientation (LTO). These are used to assess the moderation effect of the espoused cultural values on the relationship between informal sanctions and INT, and formal sanctions and INT. Also, the national cultural values that

effect to all main constructs including PCM, TCM, informal sanctions and formal sanction are assessed.

The first set of constructs (PC, PS, MB, SN and INT) is measured using four medical data misuse scenarios. Scenarios are used because they are nonintrusive, improve participants' ability to response (Nagin & Pogarsky 2001, D'Arcy et al. 2009), safeguard the participants, and results in improving internal validity (Nagin & Pogarsky 2001). The four scenarios involving medical data misuse are created based on common situations that happen in healthcare circumstances. The scenarios included in the survey are; 1) password use, 2) download medical data into personal devices, 3) unauthorized access, and 4) sharing medical data via social network application. For each scenarios, participants replied to questions measuring INT, MB, SN, PC and PS. INT, PC and PS are each measured with two-item scales where MB and SN is each measured with a single-item scale. All of the measured items are adapted from D'Arcy et al (2009), and Hovav & D'Arcy (2012).Each item is rated on an agree-disagree-7-points-Likert scale which ranges from (1) strongly disagree to (7) strongly agree. As the study aimed to examine the generalized pattern of medical data misuse behaviors rather than specific behaviors according each scenario, the composite measures of INT, MB, SN, PC and PS are created by summing the rating scores to these items across the four scenarios (D'Arcy et al 2009, Hovav & D'Arcy 2012).

The second part of the survey examines healthcare providers' perception and awareness of countermeasures. The two constructs (PCM and TCM) are measured using multi-item scales, adapted from D'Arcy et al (2009), Hovav & D'Arcy (2012), and

medical data security policies and acts. Each item is rated on an agree- disagree-7-points-Likert scale which ranges from (1) strongly disagree to (7) strongly agree. The third part of the survey examines the interaction of espoused cultural values on the relationships between informal sanctions and INT, and formal sanctions and INT. The espoused cultural values (PD, IDV, UAI, and LTO) are measured using multi-item scales adapted from CVSALE by Yoo et al (2011). Thai version of national cultural values is adapted from Watcharasriroj et al (2007).Each item is rated on an agree- disagree-7-points-Likertscale which ranges from (1) strongly disagree to (7) strongly agree.

3.5.2   Translation Processes

The instrument went through translation and back translation process. The quality of translation and validity are examined in order to ensure that the results obtained in cross-cultural research are not due to errors but rather are due to real differences or similarities between cultures in the phenomena being measured.

In our study, the translation was aimed at the conceptual equivalent of a sentence or scenario, and is therefore not a word-for-word translation, i.e. not a literal translation. The primary author translated the English questions to Thai. A bilingual linguistic PhD student then translated the Thai questions to English. An American faculty member from the foreign language department of a Midwestern university did quality comparisons of the concepts between the back translation version and the original English version. The back translated questions contained a few mismatched concepts. The Thai translation was revised, and a similar back translation to English performed. The same American faculty member compared the back translation version to the original English version.

The process of forward translation and backward translation was repeated done until every question and concept matched.

3.5.3   Instrument Pretest

The instrument was pre-tested with 23 healthcare providers over a period of two-weeks. Eleven American healthcare providers and twelve Thai healthcare providers were enrolled in the pretest. Each group of participants was pre-tested with their primary language survey. American participants reported that the scenarios reflected real situations in healthcare settings and they had little difficulty placing themselves in the hypothetical position of the scenario characters. Thai participants reported that the scenarios were easy to understand and were realistic so that they could response automatically. Wording changes to some scenarios were suggested in order to improve the clarity of the scenarios. For the countermeasure items, wording changes were suggested to reduce the respondents' biases. For the espoused cultural values, minor wording changes were suggested in some questions. A few of the items were revised or removed prior to administering the final survey.

3.5.4   Study Context and Samples

This study focuses on four groups of healthcare providers: physicians, registered nurses, medical students, and nursing students. We focus on these groups since they deal with patients and use medical data to a very large extent. For American participants, people who participated in the survey are located throughout the US. Physicians and registered nurses were enrolled via several associations of physicians, associations of

nurses, and from their hospitals. Medical students were enrolled from a Midwestern hospital where they have practicum training, and senior nursing students were enrolled from a Midwestern university. For Thai participants, physicians and registered nurses who participated in the survey are located in northern and central parts of Thailand. Physicians and registered nurses were enrolled from their hospitals. Medical students were enrolled from a medical school in the northern part of Thailand and nursing students were enrolled from a nursing school in the northern part of Thailand.

For American participants, an email invitation that included the online survey link was sent to physicians, nurses, medical students and nursing students by a collaborator of each study site. For Thai participants, an email invitation was used for physicians and nurses and was disseminated by a collaborator of that study site. A paper survey was used with medical and nursing students, and was distributed by a collaborator of those study sites.

3.6 ANALYSIS AND RESULTS

We used SPSS 21.0 for performing descriptive statistics analysis, factor analysis and construct validity, and AMOS 21.0 for performing structural equation modeling analysis (SEM). The structural equation modeling is used to answer the model causality. In our model, the antecedents are procedural countermeasures (PCM), technical countermeasures (TCM), Moral beliefs (MB), and social norms (SN) where the medical data misuse (INT) is a consequence. Perceived certainty of sanctions (PC) and perceived

severity of sanctions (PS) are mediators that mediate relationships between PCM-INT, and TCM-INT path. Espoused cultural values are moderators that interact or moderate the relationships below; 1) hi PD strengthens the relationship between SN and INT, 2) hi LTO strengthens the relationship between SN and INT, 3) lo LTO strengthens the relationship between MB and INT, 4) lo IDV strengthens the relationship between PC and INT, 5) hi UAI strengthens the relationship between PC and INT, and 6) hi IDV strengthens the relationship between PS and INT.

A total 747 healthcare providers (Thai 494 and the US 293) completed the survey. After discarding the incomplete and un-engaged data, there were 176 usable responses for the US participants, and 437 usable responses for Thai participants. Therefore, the total usable data was 613 (82.1%). A summary of the demographic characteristics of participants is provided in Table 3.2.

Table 3.2: Demographic Characteristics of Respondents

	USA (N=176, 28.7%)		Thai (N=437, 71.3%)		Total (N=613, 100%)	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Gender						
Male	76	43.2%	115	26.3%	191	31.2%
Female	100	56.8%	322	73.7%	422	68.8%
Age						
18-24	33	18.8%	249	57%	282	46%
25-34	60	34.1%	106	24.3%	166	27.1%
35-44	23	13.1%	46	10.5%	69	11.3%
45-54	19	10.8%	34	7.8%	53	8.6%
55-64	15	8.5%	1	0.2%	16	2.6%
65 and over	26	14.8%	1	0.2%	27	4.4%
Position						
Medical student	10	5.7%	169	38.7%	179	29.2%
Nursing student	59	33.5%	89	20.4%	148	24.1%
Physician	71	40.3%	81	18.5%	152	24.8%
Nurse	36	20.5%	98	22.4%	134	21.9%
EHR experiences						
< 1 year	35	19.9%	124	28.4%	159	25.9%
1-2 year	34	19.3%	85	19.5%	119	19.4%
3-5 year	58	33%	137	31.4%	195	31.8%
6-10 year	36	20.5%	53	12.7%	89	14.5%
>10 year	13	7.4%	38	8.7%	51	8.3%
EHR class attend						
Never	18	10.2%	233	53.3%	251	40.9%
1-3	81	46%	177	40.5%	258	42%
4-6	46	26.1%	18	4.1%	64	10.4%
7-10	16	9.1%	3	0.7%	19	3.1%
>10	15	8.5%	6	1.4%	21	3.4%
Smartphone use						
Yes	149	84.7%	408	93.4%	557	90.9%
No	27	15.3%	29	6.6%	56	9.1%
Tablet use						
Yes	98	55.7%	189	43.2%	287	46.8%
No	78	44.3%	248	56.8%	326	53.2%

3.6.1 Measurement Model

We assessed the psychometric properties of a model though internal consistency, convergent validities, and discriminant validities. Internal consistency is indicated using the composite reliability (CR) and Cronbach's alpha (Cronbach 1951,Fornell &Larcker 1981). The Chronbach's alpha and CR score above 0.7 indicate good internal consistency

of the data (Cronbach 1951, Fornell & Larcker 1981). All scores were above the threshold of 0.7. Convergent validity is demonstrated using these criteria; item loadings are in excess of 0.7 (Gefen et al 2000), average variance extracted (AVE) for each construct exceed 0.5 (Fornell & Larcker 1981) and/or the average of all factor loadings from the same constructs is greater than 0.7 (Fornell & Larcker 1981). Hair et al. (2010) argued in Gefen et al (2000) that regardless of using only one cut-off score at 0.7 for all items, the sufficient/significant loadings are depended on sample size, and with the samples more than 350, the factor loadings value greater than 0.3 is considered sufficient. Once again, all measured indicated convergent validity of the constructs. Discriminant validity is demonstrated if the variables load significantly only on one factor (Hair et al. 2010, Gefen et al 2000) and the square root of the AVE for each construct is larger than the inter-construct correlation (Fornell & Larcker 1981). If cross-loadings exist, the cross-loading coefficients on loading constructs should differ by more than 0.2, no cross factor loading loads more than 0.4 (Gaskin 2012a), and correlation factor between constructs in a factor correlation matrix should not exceed 0.7 (Gaskin 2012a). Both measures indicated not problems for discriminant validity.

3.6.2 Exploratory Factor Analysis (EFA)

Prior to doing SEM analysis, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) approaches were performed to examine the internal reliability of a measure (Newsom 2005) and construct validity tests were conducted to check the degree of a measure whether it can test what it claims (Brown 1996). Maximal Likelihood (ML) was used in this study because this method is generally recommended and it gives the

good results when the data is distributed normally. In addition, ML is the closet method to CFA among extraction method and it is recommended if the study is heading to perform CFA (Cudeck & O'Dell 1994). Thus, we used ML for analyzing our data. Prior to applying ML, the normality of the observed variables were tested, following the rules of thumb suggested by Curran et al. (1996),that suggested the thresholds of 2.0 for skewness, and 7.0 for kurtosis is acceptable when assessing multivariate normality. However, recent research argued that ML estimation method can be used for data with minor deviations from normality (Raykov &Widaman, 1995).Thus, in our study we followed these two assumptions by using cut-off thresholds 2.0 for skewness and 7.0 for kurtosis and allowed minor deviations from normality. In addition, we rotated the factors in a multidimensional space to arrive at a solution with best simple structure. The oblique rotation Promax was used in this study since it produces solutions a simpler structure than orthogonal rotation, and oblique rotation allows factors to correlate, and produces estimates of correlations among factors (Fabrigar et al 1999). Factor loadings and cross-loadings are the results that produced from EFA. Generally, factor loadings load cleanly on the constructs where they are intended to load and do not cross-load on the construct to which they should not load (Straub et. al 2004).

Normality testing in our data showed that according to Carren et al (1996) rule of thumb for skewness or kurtosis, none of the items demonstrated excessive skewness or kurtosis. The appropriateness of data was performed to indicate that the variables relate to one another enough to run a meaningful EFA (Gaskin2012a). The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.877, and Bartlett's test of sphericity is significant (p<0.001), both of which indicate that the factor analysis produced clear factors.

IDV4 (factor loading0.226) and PD5 (factor loading0.294) were removed due to poor factor loading. PCM1 and PCM4 were removed due to high cross loading (the difference between factor loadings in its constructs and other constructs is less than 0.2, Gaskin 2012a). PCM1 has high cross loading (the difference was 0.193) and PCM4 has high cross factor loading (the difference was 0.082). Further, LTO5, PCM2 and PCM 3 were removed due to borderline factor loading and borderline cross factor loading. After these items were removed from the analysis, the results were improved. The results of the EFA (Table 3.3) indicated the items used in this study met the requirement for convergent and discriminant validity. The criteria for convergent validity was met because all factors loaded highly on their constructs (Table 3.3) and each item loaded significantly ($p<0.01$) on its own construct and had higher correlation on its own than others (Loch et al 2003). The significance of each item to its own construct was confirmed by the correlation analysis. The results of the correlation analysis are provided in Table 3.4. Also, the average variance extracted (AVE) for each construct that exceeded 0.5 (Table 3.6) confirmed convergent validity. The criteria for discriminant validity was met because all factors loaded significantly higher on their own constructs (Table 3.4), correlation factor between constructs in factor correlation matrix did not exceed 0.7 (Table 3.5), and the square root of the AVE for each construct was larger than the inter-construct correlation (Table 3.6). For the internal consistency, the results of Cronbach alpha score are provided in Table 3.3 and the results of CR are provided in Table 3.6.

Table 3.3: Results of Exploratory Factor Analysis (Loadings and Cross loadings) and Cronbach Alpha scores

	Factors								
	TCM	UAI	IDV	LTO	PD	INT	PC	PCM	PS
Cronbach	**.94**	**.91**	**.86**	**.88**	**.79**	**.99**	**.89**	**.92**	**.97**
TCM1	**.89**	.17	-.04	.41	.08	-.38	.36	.58	.49
TCM2	**.88**	.17	-.07	.40	.10	-.40	.32	.54	.47
TCM3	**.79**	.25	.16	.34	.04	-.21	.33	.57	.37
TCM4	**.90**	.21	.06	.40	.06	-.29	.40	.52	.42
TCM5	**.92**	.22	.02	.41	.07	-.34	.39	.58	.44
UAI1	.13	**.73**	.43	.43	-.17	.02	.09	.26	.03
UAI2	.16	**.70**	.29	.42	.03	-.04	.10	.22	.09
UAI3	.22	**.88**	.37	.50	-.04	-.02	.14	.31	.09
UAI4	.20	**.92**	.36	.53	-.10	-.02	.16	.29	.07
UAI5	.22	**.88**	.38	.55	-.08	-.04	.14	.35	.08
IDV1	-.03	.32	**.78**	.16	-.19	.29	.07	.10	-.16
IDV2	.01	.26	**.72**	.10	-.04	.29	.08	-.00	-.15
IDV3	.05	.39	**.85**	.22	-.15	.19	.07	.15	-.10
IDV5	.07	.44	**.78**	.27	-.17	.21	.11	.11	-.12
LTO1	.36	.52	.21	**.77**	.03	-.18	.21	.32	.22
LTO2	.35	.52	.16	**.90**	-.05	-.23	.23	.36	.25
LTO3	.39	.42	.16	**.80**	.00	-.20	.21	.35	.22
LTO4	.36	.55	.30	**.78**	-.04	-.14	.22	.41	.19
PD1	-.02	-.04	-.06	-.01	**.71**	.01	-.04	-.07	-.00
PD2	.20	.05	-.25	.13	**.63**	-.21	.01	.13	.20
PD3	.08	-.10	-.11	-.08	**.82**	-.02	-.00	-.08	.05
PD4	.02	-.10	-.13	-.04	**.65**	-.01	.06	-.10	.09
INT1	-.37	-.02	.31	-.23	-.07	**.98**	-.22	-.28	-.53
INT2	-.36	-.03	.31	-.24	-.06	**.10**	-.21	-.27	-.52
PC1	.37	.19	.11	.24	.03	-.16	**.85**	.27	.51
PC2	.41	.10	.06	.26	.01	-.26	**.96**	.27	.59
PCM5	.67	.29	.06	.44	-.05	-.30	.31	**.89**	.38
PCM6	.63	.32	.08	.40	-.03	-.29	.25	**.94**	.36
PCM7	.65	.31	.14	.38	-.01	-.24	.30	**.81**	.37
PS1	.50	.11	-.15	.29	.10	-.52	.61	.38	**.99**
PS2	.49	.07	-.17	.25	.11	-.51	.59	.35	**.94**

Note TCM= technical countermeasures, PCM = procedural countermeasures, INT= composite score of medical data misuse from 4 scenarios, PS = composite score of perceived severity of sanctions from 4 scenarios, PC= composite score of perceived certainty of sanctions from 4 scenarios, UAI= uncertainty avoidance, IDV =individualism/collectivism, LTO= long term orientation, PD =power distance

Table 3.4: Item-to-construct Correlation vs. Correlation with Other Constructs

	INT1	INT2	MB	SN	PC1	PC2	PS1	PS2	PCM	TCM	PD	IDV	UAI	LTO
INT1.1	**.75****	.71**	.54**	.58**	-.20**	-.28**	-.42**	-.41**	-.28**	-.32**	-.04	.18**	.03	-.12**
INT1.2	**.79****	.78**	.56**	.61**	-.10*	-.19**	-.41**	-.41**	-.33**	-.31**	-.14**	.24**	-.03	-.16**
INT1.3	**.54****	.52**	.39**	.38**	-.10*	-.09*	-.23**	-.21**	-.22**	-.17**	.08	.04	-.11**	-.19**
INT1.4	**.75****	.75**	.61**	.59**	-.10*	-.17**	-.42**	-.42**	-.25**	-.21**	-.05	.31**	.05	-.08*
INT2.1	.73**	**.75****	.55**	.60**	-.20**	-.29**	-.42**	-.41**	-.28**	-.33**	-.02	.19**	.02	-.15**
INT2.2	.78**	**.80****	.58**	.61**	-.11**	-.19**	-.41**	-.41**	-.33**	-.31**	-.16**	.25**	-.01	-.15**
INT2.3	.53**	**.55****	.39**	.37**	-.07	-.07	-.21**	-.18**	-.23**	-.18**	.07	.04	-.13**	-.19**
INT2.4	.74**	**.76****	.62**	.59**	-.09*	-.16**	-.40**	-.41**	-.25**	-.20**	-.03	.30**	.03	-.09*
MB1	.53**	.53**	**.70****	.53**	-.17**	-.21**	-.38**	-.35**	-.15**	-.21**	.05	.08	-.00	-.10*
MB2	.56**	.58**	**.77****	.59**	-.15**	-.17**	-.40**	-.38**	-.22**	-.20**	-.04	.13**	-.07	-.14**
MB3	.40**	.41**	**.59****	.45**	-.10*	-.06	-.21**	-.18**	-.20**	-.13**	.09*	.02	-.17**	-.20**
MB4	.58**	.58**	**.74****	.63**	-.12**	-.16**	-.42**	-.42**	-.19**	-.15**	-.01	.24**	.02	-.06
SN1	.60**	.60**	.56**	**.75****	-.17**	-.25**	-.43**	-.42**	-.24**	-.28**	-.02	.15**	-.07	-.15**
SN2	.62**	.63**	.63**	**.80****	-.19**	-.23**	-.45**	-.43**	-.30**	-.31**	-.11**	.16**	-.06	-.17**
SN3	.43**	.43**	.53**	**.65****	-.11**	-.10*	-.24**	-.21**	-.20**	-.15**	.06	.04	-.11**	-.15**
SN4	.59**	.59**	.60**	**.75****	-.09*	-.16**	-.40**	-.40**	-.20**	-.15**	-.02	.26**	.07	-.06
PC1.1	-.04	-.02	-.07	-.07	**.71****	.52**	.28**	.23**	.13**	.16**	.00	.14**	.09*	.10*
PC1.2	-.13**	-.13**	-.15**	-.14**	**.76****	.61**	.40**	.37**	.23**	.26**	.00	.04	.13**	.18**
PC1.3	-.14**	-.13**	-.14**	-.18**	**.77****	.70**	.46**	.44**	.30**	.36**	.02	.11**	.13**	.20**
PC1.4	-.22**	-.22**	-.22**	-.18**	**.72****	.58**	.44**	.42**	.31**	.29**	.03	.05	.16**	.20**
PC2.1	-.14**	-.13**	-.13**	-.14**	.54**	**.75****	.37**	.35**	.14**	.24**	-.05	.08	-.01	.09*
PC2.2	-.16**	-.17**	-.12**	-.16**	.68**	**.80****	.46**	.46**	.24**	.27**	-.01	.01	.07	.16**
PC2.3	-.27**	-.26**	-.21**	-.27**	.63**	**.80****	.56**	.55**	.35**	.42**	.04	.03	.11**	.23**
PC2.4	-.24**	-.24**	-.22**	-.22**	.64**	**.73****	.48**	.47**	.32**	.28**	.02	.05	.15**	.23**
PS1.1	-.42**	-.40**	-.38**	-.42**	.38**	.49**	**.76****	.70**	.34**	.40**	.12**	-.06	.06	.15**
PS1.2	-.45**	-.43**	-.43**	-.44**	.43**	.50**	**.85****	.81**	.37**	.41**	.07	-.13**	.07	.21**
PS1.3	-.30**	-.29**	-.32**	-.31**	.46**	.48**	**.76****	.70**	.38**	.38**	.06	-.03	.12**	.23**
PS1.4	-.48**	-.48**	-.46**	-.47**	.38**	.44**	**.77****	.74**	.37**	.35**	.06	-.14**	.07	.19**
PS2.1	-.41**	-.40**	-.38**	-.39**	.37**	.48**	.72**	**.77****	.28**	.38**	.12**	-.08*	.02	.12**

PS2.2	-.43**	-.42**	-.41**	-.42**	.42**	.50**	.80**	**.86****	.37**	.41**	.08*	-.11**	.05	.19**
PS2.3	-.35**	-.34**	-.33**	-.35**	.42**	.48**	.76**	**.79****	.38**	.38**	.06	-.08	.10*	.23**
PS2.4	-.47**	-.44**	-.43**	-.44**	.37**	.46**	.75**	**.79****	.37**	.37**	.08	-.17**	.02	.16**
PCM1	-.34**	-.34**	-.22**	-.25**	.28**	.28**	.37**	.34**	**.75****	.55**	.07	.04	.29**	.37**
PCM2	-.32**	-.32**	-.20**	-.27**	.19**	.22**	.31**	.29**	**.71****	.51**	.14**	-.03	.14**	.24**
PCM3	-.39**	-.38**	-.32**	-.32**	.25**	.27**	.41**	.40**	**.76****	.60**	.03	.04	.23**	.36**
PCM4	-.21**	-.21**	-.17**	-.22**	.23**	.24**	.30**	.28**	**.73****	.45**	.04	.08	.24**	.33**
PCM5	-.30**	-.29**	-.19**	-.23**	.28**	.31**	.39**	.36**	**.85****	.66**	-.03	.08	.27**	.42**
PCM6	-.30**	-.28**	-.18**	-.21**	.24**	.24**	.36**	.34**	**.83****	.62**	-.02	.09*	.30**	.39**
PCM7	-.23**	-.23**	-.16**	-.20**	.30**	.29**	.38**	.35**	**.80****	.65**	.00	.14**	.29**	.37**
TCM1	-.36**	-.37**	-.25**	-.32**	.33**	.36**	.49**	.47**	.70**	**.91****	.07	-.00	.16**	.37**
TCM2	-.39**	-.40**	-.27**	-.33**	.29**	.33**	.47**	.46**	.67**	**.91****	.11**	-.03	.16**	.37**
TCM3	-.22**	-.21**	-.13**	-.18**	.32**	.31**	.38**	.36**	.64**	**.84****	.04	.17**	.24**	.33**
TCM4	-.29**	-.28**	-.22**	-.26**	.36**	.39**	.42**	.41**	.63**	**.91****	.06	.09*	.20**	.37**
TCM5	-.35**	-.34**	-.24**	-.28**	.33**	.39**	.45**	.45**	.68**	**.93****	.06	.04	.21**	.39**
PD1	.02	.02	.06	.04	.01	-.05	-.01	-.00	-.02	-.02	**.77****	-.06	-.05	-.01
PD2	-.21**	-.21**	-.12**	-.15**	.04	.02	.19**	.17**	.22**	.19**	**.73****	-.22**	.04	.11**
PD3	-.03	-.02	.06	-.03	.01	-.00	.04	.07	-.02	.06	**.81****	-.10*	-.10*	-.08*
PD4	-.02	-.00	.07	.00	.05	.06	.08	.07	-.04	.01	**.75****	-.12**	-.09*	-.06
PD5	.01	.01	.05	.02	-.04	-.04	.06	.08*	.02	.03	**.66****	-.15**	-.10**	-.07
IDV1	.28**	.28**	.19**	.231**	.087*	.04	-.14**	-.15**	.05	-.02	-.18**	**.81****	.31**	.20**
IDV2	.29**	.29**	.18**	.203**	.094*	.05	-.14**	-.14**	-.03	.01	-.04	**.79****	.24**	.14**
IDV3	.18**	.18**	.11**	.124**	.066	.05	-.09*	-.10*	.10*	.05	-.16**	**.85****	.38**	.26**
IDV4	.12**	.13**	.08*	.086*	.061	.02	.02	-.02	.11**	.12**	-.12**	**.58****	.35**	.29**
IDV5	.21**	.20**	.10*	.153**	.127**	.07	-.09*	-.11**	.08*	.08	-.17**	**.82****	.43**	.31**
UAI1	.04	.02	-.02	-.01	.09*	.06	.05	.01	.24**	.13**	-.14**	.43**	**.82****	.45**
UAI2	-.03	-.04	-.08	-.04	.12**	.07	.10*	.06	.22**	.17**	.01	.32**	**.80****	.43**
UAI3	-.02	-.02	-.08*	-.08	.17**	.10*	.11**	.07	.30**	.21**	-.04	.38**	**.89****	.55**
UAI4	-.02	-.02	-.07	-.05	.19**	.11**	.10*	.06	.29**	.20**	-.09*	.38**	**.91****	.56**
UAI5	-.04	-.04	-.06	-.06	.17**	.10*	.10*	.06	.32**	.22**	-.07	.39**	**.88****	.57**
LTO1	-.17**	-.18**	-.17**	-.18**	.19**	.21**	.24**	.20**	.37**	.35**	.03	.24**	.50**	**.83****
LTO2	-.21**	-.22**	-.20**	-.19**	.22**	.22**	.26**	.22**	.41**	.35**	-.04	.19**	.50**	**.89****
LTO3	-.20**	-.20**	-.16**	-.18**	.15**	.21**	.23**	.22**	.39**	.38**	.01	.19**	.40**	**.83****
LTO4	-.13**	-.14**	-.09**	-.11**	.22**	.20**	.21**	.19**	.40**	.36**	-.03	.32**	.52**	**.86****
LTO5	-.05	-.05	-.09*	-.07	.15**	.10*	.11**	.07	.33**	.24**	-.09*	.35**	.59**	**.76****

Table 3.5: Factor Correlation Matrix

Factors	TCM	UAI	IDV	LTO	PD	INT	PC	PCM	PS
TCM	1.00	.23	.02	.44	.09	-.37	.41	.63	.50
UAI	.23	1.00	.44	.59	-.08	-.03	.15	.35	.09
IDV	.02	.44	1.00	.23	-.19	.32	.10	.11	-.17
LTO	.44	.59	.23	1.00	-.02	-.24	.26	.44	.27
PD	.09	-.08	-.19	-.02	1.00	-.07	.00	-.06	.11
INT	-.37	-.03	.32	-.24	-.07	1.00	-.21	-.28	-.53
PC	.41	.15	.10	.26	.00	-.21	1.00	.28	.59
PCM	.63	.35	.11	.44	-.06	-.28	.28	1.00	.37
PS	.50	.09	-.17	.27	.11	-.53	.59	.37	1.00

Table 3.6: Result of Means, SDs, Reliabilities, and Correlations

	#of Items	Mean	SD	Range of Factor Loadings	CR	AVE	PCM	TCM	UAI	IDV	LTO	PD	INT	PC	PS
PCM	3	5.28	1.54	0.81-0.94	0.92	0.79	**0.89**								
TCM	5	4.57	1.57	0.79-0.92	0.94	0.75	0.72	**0.87**							
UAI	5	5.83	1.06	0.70-0.92	0.91	0.68	0.34	0.24	**0.82**						
IDV	4	5.31	1.39	0.72-0.85	0.86	0.61	0.11	0.05	0.45	**0.78**					
LTO	4	5.56	1.14	0.78-0.90	0.88	0.65	0.45	0.44	0.61	0.26	**0.81**				
PD	4	2.51	1.26	0.65-0.82	0.79	0.50	-0.05	0.07	-0.09	-0.17	-0.04	**0.70**			
INT	8	3.36	1.44	0.98-0.99	0.99	0.97	-0.32	-0.36	-0.02	0.29	-0.23	-0.06	**0.99**		
PC	8	4.23	1.26	0.85-0.96	0.90	0.81	0.33	0.44	0.14	0.08	0.27	0.01	-0.26	**0.90**	
PS	8	3.80	1.41	0.94-0.99	0.97	0.94	0.42	0.50	0.10	-0.15	0.28	0.09	-0.54	0.64	**0.97**

Bold scores = the square root of AVE

3.6.3 Confirmatory factor analysis (CFA)

Confirmatory factor analysis (CFA) was performed using AMOS 21 to check on the construct and identify the model fitness. The Maximum Likelihood (ML) estimation method was employed. The overall fit indices suggested a good fit of the model to the data; most of the indices were greater than the recommended cut-off scores (Table 3.7).

Table 3.7: Confirmatory Factor Analysis and Fit Indices

						Fit Indices				
	χ^2(DF)	χ^2/DF	NFI	IFI	TLI	CFI	GFI	AGFI	SRMR	RMSEA
Good fit		<3.00	>0.90	>0.90	>0.90	>0.90	≈0.90	>0.80	<0.10	<0.80
Model	1052.02 (395)	2.66	0.94	0.96	0.95	0.956	0.90	0.87	0.05	0.52

3.6.4 Common Method Bias

Common method bias (CMB) was performed with two tests – Harman's single-factor test, and common latent factors. Harman's single-factor test was conducted to see if the majority of the variance can be explained by a single factor (Podsakoff el al 2003). The test was conducted using unrotated principal components factor analysis with 31 extracted measures from EFA. The results showed that there was no single factor emerged from the unrotated solution, indicating CMB is not the issue. Common latent factor (CLF) was conducted to capture the common variance among all observed variables in the model (Gaskin2012b). CLF was performed using AMOS. To do this, we applied CLF in our CFA model and compared the standardized regression weights of this model to the standardized regression weights of a model without CLF. The results showed that the larger differences (greater than 0.2) (Gaskin2012b) were found in IDV1,

IDV2, INT1sum, and INT2 sum indicating there was CMB in our measures. Thus, to resolve the CMB, we imputed CLF to our model to create composite model and used these composite scores for examining our SEM model (Gaskin2012b).

3.6.5 Invariance Test

An invariance test was performed to indicate that the same construct is being measured across some specified groups, e.g. age, gender, nationality, etc. (Gaskin2012c). In this study, nationality was used as a variable to test invariance. To do this, we compared the unstandardized regression weight differences of the measured items of these two nationalities from CFA model. The significant differences of the items between these two groups indicate that the meaningful interpretation of measurement data is precluded. Our results showed that there were no significant differences of the measured items between these two nationalities. Thus the factor structure and loadings are sufficiently equivalent across groups.

3.6.6 Structural Equation Model (SEM)

Prior to testing our SEM model, we performed three multivariate assumptions including linearity test, homoscedasticity, and multicollinearity test. The linearity test (Gaskin2012d) was done in order to confirm that the model is sufficient to be tested by using SEM (AMOS), since AMOS fits only linear equation model. To do this, we did curve estimation for all paths in our model. The results showed that all paths were significant when applying the linear model. Homoscedasticity was tested to confirm that the consistent variance across different levels of the variable is existed because serious

violations in homoscedasticity (assuming a distribution of data is homoscedastic when in actuality it is heteroscedastic) may result in overestimating the goodness of fit as measured by the Pearson coefficient (Hair et al. 2010). To do this, we applied linear regression to our paths and plotted each relationship between regression standardized residual of dependent variable and regression standardized predicted value of independent variable (Gaskin 2012f). We found that all paths had consistent relationships. These mean that the homoscedasticity for all paths were met (Hair et al 2010). The multicollinearity test was done to examine whether the independent variables are too highly correlated with each other since the high correlation can make the construct less stable (Hair et al 2010). The recommended test for multicollinearity is to calculate variance inflation factors (Gaskin 2012f). To do this, we ran a regression models with one independent item serving as the dependent variable and the other items designated as independent variables and then regressed it on all the remaining independent variables. All variance inflation factors in each regression model were less than 3, which were well below the usual cutoff level of 10 (Hair et al 2010). Hence, multicollinearity was not a problem in our data set.

The hypotheses were tested by examining the SEM. The test includes estimating the path coefficients, which indicate the strength of the relationships between the independent and dependent variables and the R^2 value (the variance explained by the independent variables) (Hair et al 2010). Results of the analysis including standardized path coefficients, interaction coefficients, significances, and the amount of variance explained (R^2 value) for each dependent variable is shown on Figure 3.2. Also the model fit values of this model are showed under Figure 3.2.

Figure 3.2: Results of SEM Analysis - Overall
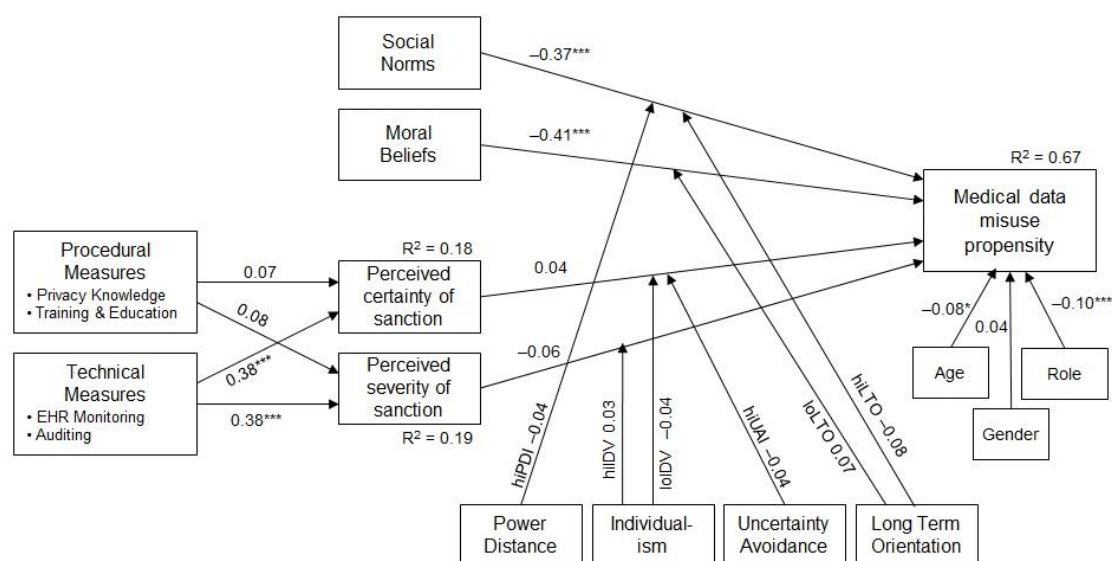
P value <0.05 *, <0.01**, <0.001***

Model fit values

	χ²(DF)	χ²/DF	NFI	IFI	TLI	CFI	GFI	AGFI	SRMR	RMSEA
Model	1730.16(723)	2.39	0.91	0.95	0.94	0.95	0.88	0.85	0.08	0.05

The results showed that the combination of informal sanctions, formal sanctions, and control variables explained 67% of INT variance. The combination of PCM and TCM explained 18% of variability in PC and 19% of variability in PS. Consistent with Falk & Miller (1992), the R^2 values for all endogenous constructs exceed 10%, implying a satisfactory and significant model. For the countermeasures PCM and TCM each had a positive impact on both PC and PS. However, only TCM had positive significant effect on PC (P<0.001) and PS (P<0.001). Consistent with H1, H2, H3 and H4, individuals who are aware of PCM and TCM will be more strongly aware of PC and PS. Thus, H1, H2, H3 and H4 hypotheses are supported where H3 and H4 are supported strongly.

For informal sanctions, SN and MB, each had significant negative effect on INT at $p<0.001$. PS had negative effect on INT but it was not significant. In contrast with expectations, PC had positive effect on INT. For the control variables, age had significant negative effect on INT at $p<0.05$. This means that the seniors had less medical data misuse propensity. Also, role had significant negative effect on INT at $p<0.001$. An examination of the data indicated that nurses and physicians had considerably less propensity to misuse medical data misuse than medical students and nursing students. For the moderation effects, there was no significant interaction shown on our testing hypotheses. The results of these interaction moderations will be provided more in the moderation section. All values in a model fit table indicated good fit.

Figure 3.3 depicts the results of SEM analysis including standardized path coefficients, significances, and the amount of variance explained (R^2 value) comparing the US and Thai healthcare providers. The model fit values of this model are shown under Figure 3.3. In this figure, we used the national cultural values that assumed to have the same impact to people who are from the same culture. Thus the moderations, resulting from espoused cultural values on formal and informal sanctions were ignored.

Figure 3.3: Results of SEM Analysis –the US and Thai Healthcare Providers
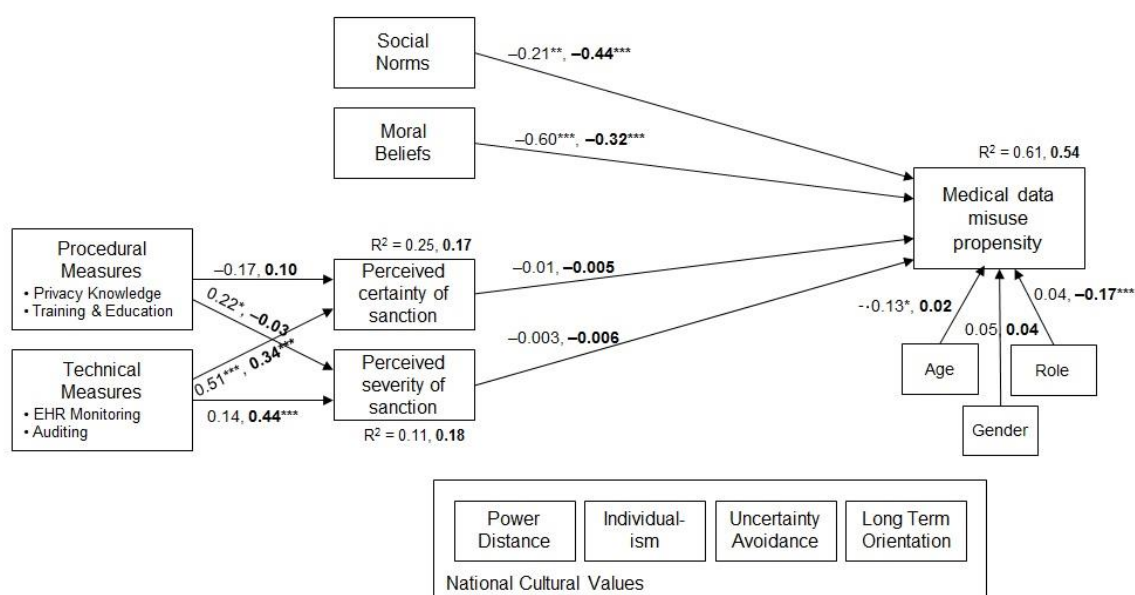
P value <0.05 *, <0.01**, <0.001***   Numbers without bold =Standardized path coefficient for US participants, Numbers with bold = standardized path coefficient for Thai participants

Model fit values

	χ²(DF)	χ²/DF	NFI	IFI	TLI	CFI	GFI	AGFI	SRMR	RMSEA
Model	1112.16(396)	2.81	0.95	0.97	0.96	0.97	0.92	0.88	0.12	0.04

The results showed that the combination of informal sanctions, formal sanctions, and control variables explained 61% of INT variance for the US participants and 54% of INT variance for Thai participants. The combination of PCM and TCM explained 25% of variability in PC for the US, participants and 17% for Thai participants, and 11% of variability in PS for the US participants and 18% for Thai participants. PCM had positive effect on PC for Thai participants but showed negative effect on PC for the US participants, which was contrasting to the theory. Consistent with H1A, the result has the same direction that supported this hypothesis. PCM had significant positive effect (p<0.05) on PS for the US participants but PCM had negative effect on PS for Thai

participants which contrasting to the theory. Thus, the result supported H2A. TCM showed positive significant effects on PC for both the US and Thai participants at $p<0.001$ and the path coefficient for the US participants (0.51) is stronger than for Thai participants (0.34). Thus, the result supported H3A. TCM had positive significant effect on PS for Thai participants at $p<0.001$ and positive effect on PS for the US participants. Thus, H4A was not supported by the result. SN had negative significant effects on INT at $p<0.01$ for the US participants and $p<0.001$ for Thai participants. Thus, the result supported H5A. MB had negative significant effects on INT at $p<0.001$ for both the US and Thai participants where the US had stronger path coefficient (0.60) than Thai (0.32). This did not support H6A. Formal sanctions had negative effects on INT but there was no significant effect shown on both the US and Thai participants. The path coefficients for PC on INT for the US participants (-0.01) was to some extent stronger than for Thai participants (-0.005). Thus, H7A was not supported. The path coefficients for PS on INT for the US participants (-0.003) was weaker than for Thai participants (-0.006). Thus, H8A was not supported. For control variables, age showed negative significant effect on INT for the US participants at $p<0.05$, which means that seniors in the US have lesser medical data misuse. Roles showed significant negative effect on INT for Thai participants at $p<0.001$, which means that Thai nurses and physicians have lesser medical data misuse propensity than medical students and nursing students. National cultural values comparison will be discussed in the multi-group moderation section. All values in the model fit indicated good fit except SRMR. The SRMR acceptable value should be less than 0.1.

3.6.7 Moderation Effects

Moderation testing was used in this study relying on the concept that moderation occurs when the relationship between two variables depends on a third variable (Cohen et al 2013). The third variable is referred to as the moderator variable or simply called the moderator. In our study, we have two moderation effects. One is form the categorical independent variable (nationality), and the other is through the third variable interaction effect (espoused cultural values).To do the categorical moderation using nationality, we followed Gaskin (2012g). We set up a two-group model (US/Thai) in AMOS, and tested it using chi-square differences, and using critical ratios. The results were provided on Table 3.8.

Table 3.8: Results of Multigroup Moderation – the US and Thai Healthcare Providers

Hypotheses/ paths		US		Thai		
		Unstandardized estimate	P	Unstandardized estimate	P	z-score
H1A	PC←PCM	-0.134	0.836	0.333	0.137	0.682
H2A	PS←PCM	1.475	**0.013**	-0.084	0.658	**-2.501****
H3A	PC←TCM	2.427	**0.000**	1.118	**0.000**	**-2.481****
H4A	PS←TCM	0.588	**0.150**	1.389	**0.000**	**1.752***
H5A	INT←SN	-0.182	**0.002**	-0.438	**0.000**	**3.355*****
H6A	INT←MB	-0.569	**0.000**	-0.322	**0.000**	**-2.993*****
H7A	INT←PC	-0.007	0.876	-0.005	0.931	0.034
H8A	INT←PS	-0.003	0.956	-0.006	0.915	-0.045
	INT←Age	-0.3	**0.033**	0.11	0.645	1.476
	INT←Gender	0.395	0.330	0.391	0.280	-0.008
	INT←Role	0.182	0.507	-0.676	**0.000**	**-2.529****

Notes: *** p-value < 0.001; ** p-value < 0.01; * p-value < 0.05

From Table 3.8, H2A, H3A, and H5A were significantly supported by the results. The result supported H1A but it was not significant. H4A and H6A were not supported as the results supported the other nationality regarding our hypotheses but the significant differences were found. The results did not support H7A and H8A.

To test the third variable interaction effect (espoused cultural values), we used two-way interactions method that followed Aiken & West (1991). We standardized independent variables, dependent variable, and moderators. Then, we regressed each interaction between independent variable and moderator (independent variable x moderator) on dependent variable and used the unstandardized regression coefficient of these 3 variables to plot a two-ways interaction graph, provided by Dawson (2014). The path coefficients of the interaction and their significances are presented in Figure 3.2. The results of the two- ways interaction effects and their interpretation are provided in Figure 3.4.

Figure 3.4: Two-way Interaction and Interpretations of Interaction Effects
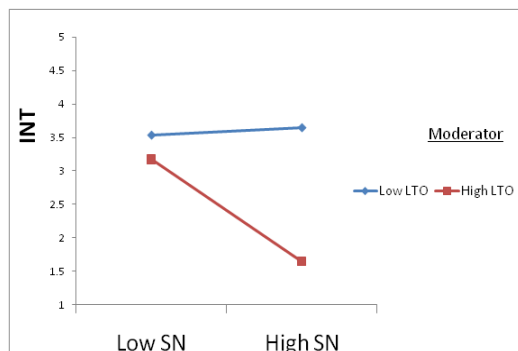
3.4.1 High LTO strengthens the negative relationship between SN and INT
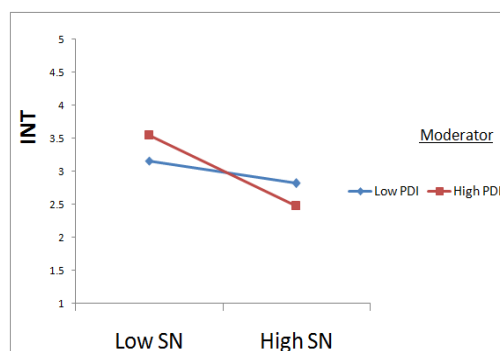
3.4.2 High PD strengthens the negative relationship between SN and INT
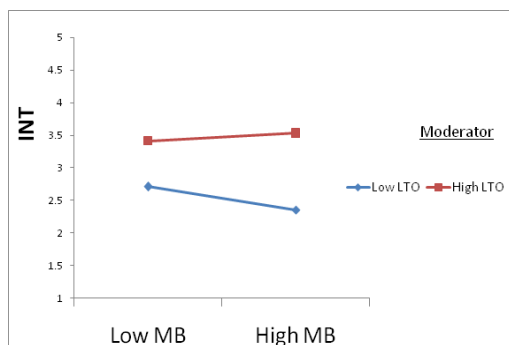
3.4.3 Low LTO strengthens the negative relationship between MB and INT
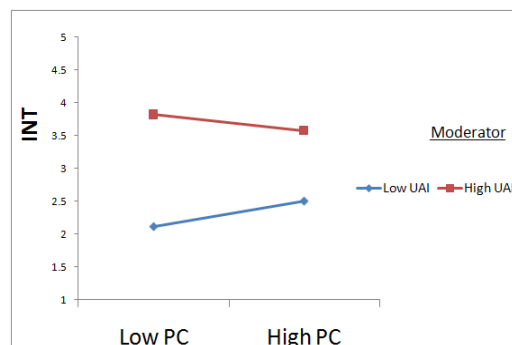
3.4.4 High UAI dampens the positive relationship between PC and INT
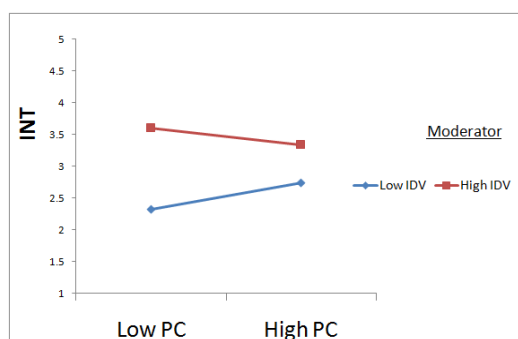
3.4.5 High IDV strengthens the positive relationship between PC and INT
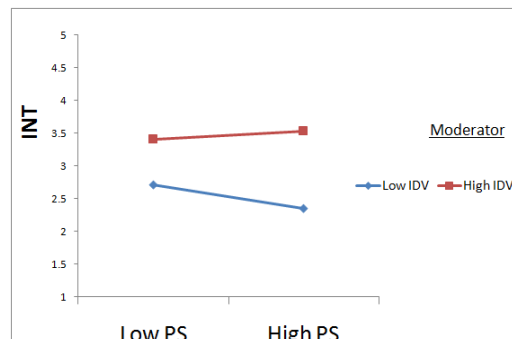
3.4.6 High IDV dampens the negative relationship between PS and INT

From the two-way interactions and their interpretations, we can summarize that

H5 (hiLTO), and H5 (hiPD) was supported (Figure 3.4.1 and 3.4.2). H6 was also

supported (Figure 3.4.3). H7 was harder to interpret since the relationship between PC

and INT is counter to deterrence theory. However, we can assume that as high UAI

dampened the positive relationship between PC and INT. Thus, high UAI strengthen the

negative relationship between PC and INT such that H7 (hiUAI) was supported. The

same logic was applied to H7 (loIDV) and such that the H7 (lo IDV) was rejected as low

IDV dampened the negative relationship between PC and INT. H8 was rejected

according to the interpretation of Figure 3.4.6. This rejection is also counter to the theory

that on individualism (Pan 2008). The hypotheses testing summary results are provided in

Table 3.9.

Table 3.9: Summary of Hypotheses Tests

Hyp. no.	Hypothesis (direction)	Standardized Path coefficients	Significance /Cross-Cultural significant Difference	Predicted Direction (Supported?)
H1	PCM→ PC	0.065	NS	Yes but NS
H1A	PCM→PC (TH>US)	0.102(TH),-0.017(US)	NS	Yes but NS
H2	PCM→PS	0.078	NS	Yes but NS
H2A	PCM→PS (US>TH)	-0.027(TH),0.222*(US)	P<0.01	Yes
H3	TCM→PC	0.375***	P<0.001	Yes
H3A	TCM→PC (US>TH)	0.336***(TH),0.509*** (US)	P<0.01	Yes
H4	TCM→PS	0.378***	P<0.001	Yes
H4A	TCM→PS(US>TH)	0.443***(TH),0.144(US)	P<0.05	No (TH>US)
H5	SN→INT (Mod by hiLTO/ hiPD)	-0.079(LTO),-0.036(PD)	NS,NS	Yes but NS
H5A	SN→INT (TH>US)	-0.437(TH)***, -0.209(US)**	P<0.001	Yes
H6	MB→INT(Mod by lo LTO)	0.066	NS	Yes but NS
H6A	MB→INT(TH>US)	-0.321(TH)***, -0.597(US)***	P<0.001	No (US>TH)
H7	PC→INT(Mod by hiUAI/loIDV)	-0.036(UAI),-0.035(IDV)	NS,NS	Yes but NS to hiUAI, No to loIDV
H7A	PC→INT(TH>US)	-0.005(TH),-0.010(US)	NS	No (US>TH) but NS
H8	PS→INT(Mod by hi IDV)	0.025	NS	No
H8A	PS→INT(US>TH)	-0.006(TH),-0.003(US)	NS	No (TH>US) but NS
Control	Age →INT Gender→INT Role→INT	-0.074 0.035 -0.104	P<0.05 NS P =0.001	

P value <0.05 *, <0.01**, <0.001***

Note; TH= Thai, US= American, NS= not significant

3.6.8 Mediation

Mediation effects were also tested in our study. The mediation effect was tested since PC and PS served as mediators. The mediation effect was tested using Baron and Kenny's approach (Baron & Kenny 1968) and Preacher & Hayes Bootstrapping method (Preacher & Hayes 2004). The Baron and Kenny's approach tests the mediation by measuring the differences of direct effect of PCM on INT and TCM on INT and the direct effect of PCM on INT via mediators (PC and PS) and the direct effect of TCM on INT via mediators (PC and PS). The Preacher &Hayes Bootstrapping method measures the indirect effect. Benefit of the Preacher and Hayes Bootstrapping method is that it is a non-parametric test so the assumption of normality is not required while Barron and Kenny's does. Thus it is more common to a recent publication to report both methods when testing mediation effect. According to Baron& Kenny (1968), we found that the significant of TCM-INT path dropped when applying PC or PS (mediators). These mean that PC and PS had partial mediation effect on path between TCM and INT. There was no mediation effect of PC and PS found on PCM and INT paths. For indirect meditation effect, there were indirect mediation effects of PC and PS found in the relationships between PCM and TCM on INT when either PCM was added on TCM or TCM was added on PCM and both were tested at the same time. The results of the mediation effect are provided in Table 3.10.

Table 3.10: Summary of Mediation Effects

Relationships	Direct without mediator	Direct with mediator	Indirect
PCM-PC-INT	0.016(NS)	0.024(NS)	NS(No mediation)
PCM-PS-INT	0.016(NS)	0.024(NS)	NS(No mediation)
TCM-PC-INT	-0.150(***)	-0.104(*)	NS(No mediation)
TCM-PS-INT	-0.150(***)	-0.104(*)	NS(No mediation)
SN-INT	-0.304(***)		
MB-INT	-0.359(***)		
PCM+TCM-PC-INT			P=.019(*)(Mediation)
PCM+TCM-PS-INT			P=.020(*)(Mediation)
TCM+PCM-PC-INT			P=.009(**)(Mediation)
TCM+PCM-PS-INT			P=.037(*)(Mediation)

Notes: *** p-value < 0.001; ** p-value < 0.01; * p-value < 0.05. PCM+TCM = add TCM on PCM-INT path and TCM+PCM = add PCM on TCM-INT path

3.6.9 Post Hoc Analysis

We did post-hoc power analysis with 95% confidential interval in order to check whether our sample size has strong statistical power to conclude our hypotheses. The observed statistical power = 1.0 (cut-off is 0.8). This means that our sample size had enough power.

3.7 DISCUSSION

The purpose of our study was to examine whether deterrence theory was culturally dependent. We explored the cross-cultural efficacy of security countermeasures, moral belief and social norms in deterring medical data misuse at the national level. We also examined how espoused national cultural values at the individual

level influence the relationships between moral belief, social norms, deterrence perception and the intent to misuse medical data. The study answered the national level question by examining the effect of deterrence on the relationship between PCM and INT, and TCM and INT, and the relationship between SN and INT, and MB and INT, in two different cultures. For the individual level, the study examined the individuals' responses to deterrence, and the moderation effects of espoused cultural values between SN and INT, MB and INT, PC and INT, and PS and INT. At the national level, three out of eight hypothesized relationships were found in expected direction and significant. Two hypotheses were contrary to expectation and were also significant. For the second question, two out of eight hypothesized relationships were found in expected direction and significance. The others were insignificant, and two were in the direction opposite to that hypothesized. These results are discussed below.

3.7.1 Security countermeasures

The results showed that for procedural countermeasures, PC had a stronger influence on medical data misuse propensity for Thai samples whereas the influence of PS was stronger for the US. In the case of technical countermeasures, PC and PS had stronger effect on medical data misuse propensity for Thai than the US. Thus, deterrence is not culturally neutral. The reason why PC has stronger effect on Thai culture is that PC is related to the discovery of the act that results in losing face (Hovav & D'Arcy2012) and face saving and Confucianism are important in the Thai context (Hofstede 1991, Watcharasriroj et al 2007, Roongrerngsuke 2010). As a result, they pay more attention to the consequences that may negatively affect their pride and/or image. Contrary to

expectation, PCM had a negative effect on PC for the US samples which means that the hospital security policies and security training do not increase healthcare providers' awareness of getting caught for medical data misuse. A possible explanation might be the more healthcare providers know about the hospital security policies and training, the more they realize the loopholes, and the difficulties in the discovering misuse incidents. In addition, the testing scenarios covered, i.e. using others' password, downloading medical data into personal devices, unauthorized accessing, sharing medical data on social media, are all common situations, and respondents may realize that few people have been reported and/or caught in these situations. This might explain why PCM had less positive effect on the individuals' perception of certainty and severity of sanctions than TCM. Although there are policies that indicate there will be punishments for medical data misuse, generally few people are caught or punished for committing such violations of policy. PCM had negative effect on PS for Thai sample where it had positive and significant effect on the US. One possible explanation is that the security policies and training that emphasizes strong punishments that lead to psychological trauma and losing face, may inspire negative consequences and revenge rather than adherence in the case of Thai subjects (Roongrerngsuke 2010). Furthermore, as these scenarios are very common, healthcare providers are not likely to be caught or reported. Since the Thailand healthcare information security regulations (Electronic Transaction Act, B.E. 2544, Electronic Transaction Act, (volume 2), B.E. 2551, National Health Act, B.E. 2550) are not as strong as HIPAA, Thai healthcare providers may not foresee the severity of punishment of being caught. In addition, PCM had indirect mediation effect

on INT when combining with TCM. This indicates that PCM should be combined with TCM in order to increase its effectiveness for reducing medical data misuse.

TCM had strong and significant effect on the individuals' perception of certainty and severity sanctions. The influence of TCM was stronger than PCM, suggesting that EHR monitoring and auditing is a useful mechanism for convincing healthcare providers that medical data misuse will be detected. In addition, TCM had direct effect on INT, partial mediation effect through PC and PS on INT, and the indirect mediation effects when combining with PCM. These indicate that TCM is an effective countermeasure for reducing medical data misuse. One possible explanation is that monitoring or auditing produces strong evidence, and individuals cannot deny their involvement and will more likely result in punishments. TCM had a stronger effect on PC in the US more than in Thai. This can be explained that US culture favors individualism, and individual users being monitored or audited is related to being rewarded or punished (Hovav & D'Arcy 2012). Thus they assess the impact of being discovered (Hofstede 1984, 1991) and decide whether they are likely to engage in medical data misuse. Contrary to the hypothesis, TCM had stronger effect on PS for Thai more than the US. This suggests that emphasizing the severity of punishments and of being discovered by monitoring and auditing to Thai healthcare providers is the most effective method in reducing medical data misuse.

3.7.2 Social Norms

As expected, social norms are significantly related to medical data misuse. This finding indicates that healthcare providers have considerable influence on their

colleagues' perception of the medical data misuse. It implies that in addition to implementing policies and conducting training, the authorities should ensure that policy guidelines and lessons learnt in these programs are actively applied and observed by the healthcare providers when they are carrying out their work in order to create an effective information security climate in healthcare organizations. As predicted, SN had a stronger negative effect on INT among Thai healthcare providers than it did for US healthcare providers. The explanation is Asians have a collectivist nature and are more likely to adhere to social norms in order to create harmony in the communities and avoid conflicts among colleagues, and authorities (Garland &Brown 1972, Ho 1976, Hofstede 1991, Roongrerngsuke 2010).

Power distance moderated the relationship between social norms and medical data misuse. As expected, the negative relationship was stronger for individuals with high espoused power distance cultural values because these people believe in the power of the superiors over subordinates so that they are more likely to conform to social norms in order to avoid conflict with authorities (Hofstede 1991, Srite & Karahanna 2006). Thus by emphasizing the authority power of the healthcare providers who hold high power distance value in information security polices and training, medical data misuse in this group may be curbed.

Long term orientation moderated the relationship between social norms and medical data misuse. As expected, the negative relationship was stronger for individuals with high espoused long term orientation cultural values because these people follow Confucianism. They respect tradition, inequality between people, loyalty, long term

goals, and non-confrontation among people (Hofested 1991, 1994). Thus, emphasizing a long term goal and loyalty to the healthcare providers who hold high LTO value in information security policies and training may result in decreasing medical data misuse in this group.

3.7.3 Moral Belief

The influence of MB on INT was significant for both samples. However, contrary to expectations, MB did not have a stronger effect on INT for Thai healthcare providers. MB exerts a very strong influence on medical data misuse in the US culture. The result was consistent with the findings from Hovav & D'Arcy (2012) on IS misuse that noted that US users had higher MB than Korean users. Thus, this is noteworthy because this study is conducted in examining medical data misuse in healthcare settings, where it extends prior work conducted with mostly U.S. samples in others settings that found MB to be the strongest predictor of illicit behavior (Hovav & D'Arcy 2012). Another plausible explanation might be referring to the LTO, the US healthcare providers believe in short term orientation (STO) where STO is related with face saving and face saving is related with moral belief (Hofstede & Bond 1988, Park et al 2005). Thus culture with high STO may have higher MB. As Confucianism is not usually applied in the western culture, this interpretation using Confucianism to explain the finding needs further study to confirm this assumption.

As predicted, low LTO moderated the relationship between moral belief and medical data misuse. The negative relationship was stronger for individuals with low espoused long term orientation cultural value. These people are concerned with face,

favor for quick results, and do not accept multiple truths (Hofested 1991, 1994). Thus they are more punctual and do not hesitate to differentiate between right and wrong.

3.7.4 Perceived certainty of sanctions and Perceived severity of sanctions

The path coefficient scores for PC and PS were low and insignificant, compared to previous studies on IS misuse (D'Arcy et al 2009, Hovav & D'Arcy 2012). The possible explanation might be the scenarios that we used in the study were too common so that the healthcare providers did not consider these situations as medical data misuse incidents. Therefore, they did not perceive the sanctions of committing such behaviors regarding the scenarios. The commonness of the scenarios were reported by the pre-testers that "the scenarios are more realistic, and more common than many realize that these kinds of behaviors are considered misuse" and "the scenarios were very thought provoking about some usual behaviors considered medical data misuse".

Contrary to expectations which we based on the higher PC in Thai and higher PS in the US, we found that PC had higher effect on INT for the US healthcare providers than Thai healthcare providers, and PS had higher effect on INT for the Thai healthcare providers than the US healthcare providers. This suggests that the previous explanations about losing face in Asian subjects, and individualism in Western subjects might not fit with deterrence in healthcare settings. More studies are needed in order to confirm whether similar results are obtained in others healthcare settings. One possible explanation is that globalization makes Asian people, especially young generations, think and behave like Westerners. In this study, Thai participants aged 18-35 were the majority segment of the study. Thus their thought might be influenced by American culture since

Thai education has been influenced by Western so that maybe we cannot apply the cultural values that had been studied over than decades in the Asian new generation.

As expected, UAI moderated the relationship between PC and INT. The negative relationship was stronger for individuals with high espoused uncertainty avoidance. Those with high UAI scores cannot tolerate unpredictable, unstable, and changeable situations (Hofested 1991, 1994). It follows that these individuals need certainty to reduce their anxiety. Thus, emphasizing certainty of sanctions in people with high UAI reduces the propensity for medical data misuse.

 Contrary to expectation, low IDV did not strengthen the relationship PC on INT. Salt et al (2011)'s study reported that people who espoused low IDV tend to conceal other's faults or their faults that might relate to group images and need PC to encounter their misuse behaviors. However, in the study, we found the negative relationship between PC and INT was weakened for individuals who espoused low IDV. Our finding was consistent with Park et al (2005) that supported that it is not true that people with low IDV are likely to sit back and keep quiet about his or her boss's or peer's wrongdoing. Thus, the relationship between PC and INT was not moderated by low IDV.

Contrary to expectation, we found that high IDV did not strengthen the negative relationship between PS and INT. The finding in this study did not support the theory that people with high espoused IDV may exhibit concern about themselves, and calculate costs, and benefits before committing, which therefore the severity of sanctions may encounter their misconducts. Since the finding was opposite to what we expected, more

studies in the deterrence in healthcare settings are needed in order to confirm or argue our findings.

3.7.5 Control variables

Age had negative impact on INT. This indicates that younger providers are more prone to engage in medical data misuse. While this is not surprising, it is a cause for concern. Likewise, role was also negatively correlated with INT, suggesting that physicians and nurses are less likely to engage in medical data misuse than are medical and nursing students. When analyzing nationality, we found that medical data misuse propensity was less among American senior healthcare providers than their younger counterparts. However, the age of healthcare providers did not show any significant different on medical data misuse for Thai healthcare providers. This finding is consistent with D'Arcy et al (2009) that found that in the US sample, age had significant negative relationship to INT. For Thai healthcare providers, we found that physicians and nurses had lower medical data misuse propensity than medical students and nursing students. However, the role difference did not show any significant difference in the case of American healthcare providers. A possible explanation for Thai healthcare providers is that Thai physicians and nurses had more information security training and exposure experiences to medical data misuse through their working experience whereas medical students and nursing students have limited training and experiences in exposure to medical data misuse cases. Thus medical students and nursing students are not aware about medical data misuse issue and consequences of the sanctions. This suggests that in

order to reduce medical data misuse among the students and younger aged healthcare providers, more education about health information security and training is needed.

3.8 RESEARCH CONTRIBUTIONS

Overall, the results of our study support and expand the findings from cross-cultural research comparing Western and Asian cultures. Our study is the first study that applies the deterrence theory to examine cross-cultural healthcare providers, currently working in healthcare settings, on medical data misuse propensity in both individual level and national cultural level. Given recent trends in globalization, our questions focus on how national cultural values influence individual behaviors. For the individual level, our study offers a series of hypotheses of how espoused cultural values influence the constructs and relationships of an extended model of deterrence. In doing so, it makes a contribution to the cross-cultural stream by disaggregating it into its espoused value dimensions, which can then be treated as individual difference constructs in theoretical models. Although the results from the moderation effects of espoused cultural values to sanctions were not always significant, the direction and path coefficients given by these interactions outline the moderating role that espoused cultural values have on the relationships between sanctions and medical data misuse. Results from the study can be useful for administrative and educational officers to improve hospital policies and training about medical data misuse.

Medical data misuse is affected by several espoused cultural values including PD, UAI, IDV, and LTO. This finding suggests that several implementation interventions can be undertaken to reduce medical data misuse. For example, our study highlighted that individuals with high PD and high LTO tend to comply with the social norms. Therefore, an intervention that increases the information security environment or the security behaviors of surrounding people, in particular the authorities will likely reduce medical data misuse for these subjects. In addition, we believe that this approach can be generalized to other theoretical models involving cross-cultural investigation on deterrence at the individual level. For national cultural level, this study utilized in Hofstede's national cultural values to study this phenomenon. By comparing the underlying process by which security countermeasures affect medical data misuse across two distinct cultures, our research emphasizes the difference that PC versus PS play in reducing such behavior; more broadly it shows that behavioral theories developed and tested in Western cultures may work differently in Asian cultures. Furthermore, we found that due to the globalization trends, Asian new generations tend to adopt more Western culture through the media, education, and direct exposure. Thus, some national cultural value's assumptions might not be valid or applicable for newer generations of Asians. For example, our study found some assumptions that were contrary to previous studies – i.e. Westerners are individualists and tend to think about themselves rather than the group benefits so they are aware of the severity of sanctions rather than the certainty of sanctions (Hofestede 1991, 1994). We found that Thais were more aware of the severity of sanctions and were less aware of the certainty of sanctions. The explanation might be as our post hoc analysis found that eighty percent of Thai participants aged 18-

35, which means that majority of them were new generation so that the results received might be from the influence of Thai young generation. A study by esh Srivastava (2012) emphasized that Thai and Indian Gen Y are more individualistic than their older counterparts.

The study also furthered our understanding of factors that influence the deterrence process. We included moral belief and social norms as antecedents that have direct effect to deter medical data misuse propensity. As a result of adding moral belief (MB) and social norms (SN) in the model, we found that the R^2 was increased from 14% (our previous study that had only PC and PS deterred INT) to 67%. This means that the medical data misuse propensity is perhaps better explained by moral belief and social norms. Thus in order to make the deterrence model to be more complete to explain medical data misuse propensity, MB and SN should be added into the model.

We also found that control variables (i.e age, role) have an impact on medical data misuse propensity. For the US participants, age had negative effect on medical data misuse. For Thai participants, role had negative effect to medical data misuse. Thus for the US participants, emphasizing medical data security policy to young age healthcare providers is necessary since they may lack some knowledge of medical data misuse where knowledge and training on medical data misuse are needed for Thai medical students and nursing students.

3.9 LIMITATIONS ANDFUTURE RESEARCH

There are several limitations of our study, which represent candidates to be addressed in future work. First, we based our hypotheses on cultural differences between the US and Thai on Hofstede's published scores on these cultural dimensions. The Hofstede's score might not be up to date according to the globalization that cultural differences across countries may have changed so that these scores do not accurately depict present cultural differences, particularly among younger generations of medical practitioners. As a result, we found that some results were not consistent with prior assumptions from the theory. However, further study is needed in order to confirm these changes in assumptions. Second, the response rate was higher for Thai participants (437 Thai participants vs. 176 US participants; where the majority of those Thai were medical students - 169). As a consequence, the results based on espoused national cultural values might be skewed by Thai participants, in particular Thai medical students. Third, the survey examined only the attitudes of participants. In real situations, there may be other circumstances or surrounding factors that affect people's decisions and make people respond differently regarding their intention to engage in medical data misuse. Although we tried to create the scenarios based on common situations that happen in healthcare settings, there is no guarantee that their responses reflect what they would actually do when faced with the situation in real life. Future research that observes actual behaviors of healthcare providers at their institutions over a period of time can add the credibility to the model. In addition, the scenarios that we used in the survey can serve as a double-edged sword. On the one hand, it makes participants more comfortable to imagine themselves in these situations. On the other hand, the scenarios may make participants

less aware whether these scenarios are considered as medical data misuse since they are common and may not entail any discipline or sanction. As a result, the scenarios that we used effected participants' perceptions on certainty and severity of sanctions and results in low PC and PS scores. Fourth, the majority of Thai participants were located in the northern part of Thailand, possibly limiting generalizability to the Thai medical practitioner population. This was not the case for the US participants, though. Fifth, the study focused only 4 groups of healthcare providers including physicians, nurses, medical students, and nursing students. Thus, future study that includes both non-professional healthcare providers (i.e. accountant, registrar,..) and other professional providers (i.e. clinical laboratory technicians, x-ray technicians,..) since they also involve with medical data and patients for both Thai and US may represent the complete picture of cross-cultural study of healthcare providers on medical data misuse propensity.

3.10 CONCLUSIONS

Our study is aimed at examining whether deterrence has a different impact based on national cultures and at the individual level. The results suggested that the influences of perceived sanctions differed across cultures and the sanctions assumptions based on previous theory may not be applicable to the younger Asian generation. Further research is required in order to explain whether the national cultural values adopted by the younger Asian generation have already changed. For the individual level, the individually espoused culture has a different impact on the relationship between sanctions and medical data misuse. The predictive power of deterrence theory could be enhanced

when adding other informal constructs including moral belief and social norms. Procedural countermeasures and technical countermeasures have different impact for Thai and the US participants. Procedural countermeasures have uncertain and contrary results on sanctions perception for Thai and US healthcare providers whereas technical countermeasures have stronger positive impacts on sanctions perception for Thai and US healthcare providers. Technical countermeasures have partial direct mediation effect to medical data misuse whereas procedural countermeasures do not. However, when combining procedural countermeasures and technical countermeasures, indirect mediation effects were observed. Therefore, it is recommended that procedural countermeasures be combined with technical countermeasures in order to reduce medical data misuse among healthcare providers. We hope that our study provides a general framework and sets the stage for future research on the national cultural values that effect deterrence in healthcare settings at the national level and the interplay between espoused cultural values and deterrence in healthcare settings at the individual level.

CHAPTER 4

ESSAY 3: INTENTION TO SELF-DISCLOSE PERSONAL HEALTH INFORMATION IN A SOCIAL MEDIA CONTEXT

4.1 INTRODUCTION

Participation in social networking sites has dramatically increased in recent years. The rapid increase in participation has been accompanied by a progressive diversification and sophistication of purposes and usage patterns across different social networking sites. A recent statistics form Facebook 2013 reported that all over the world, there are 1.31 billion monthly active Facebook users. Velleghem et al (2012) reported that more than 7 out of 10 Internet users are member of at least one social network account. This drastic increase of social media users is because of the increase in numbers of smartphone users worldwide (Velleghem et al 2012). The study also said that smartphone users visit social network sites more often than people who do not have a mobile internet connection.

Researchers have identified several reasons for using social networks tracing back to activities involving self-expression, communicating with others, and maintaining relationships, first identified in (Wheeless & Grotz 1976). This assumption is confirmed by a study by Dwyer et al (2007) that popular activities among social network users include activities relating to self-expression and communication with others, which may manifest as updating others on their activities and whereabouts, sharing photos and archiving events, getting updates on activities by friends, displaying a large social network, presenting an idealized persona, sending messages, and posting public testimonials. This is also borne out in a study by Tamir & Mitchell (2012) that found that

30% to 40% of what people express on their social networks arestories about themselves including their experiences and activities.

Posting about one's health is a relatively less common phenomenon. A survey by PwC (2012) involving 1060 participants focused on consumers who use social media for health-related activities, and found that the activities engaged in ranged from commenting on others' health experience, posting about health experiences, joining health forums or communities, and tracking and sharing health symptoms/behaviors. In addition, users are likely to share their positive and/or negative experiences that they receive during the treatments in terms of caring that they receive at a hospital or medical facilities. These experiences include their physical and psychological responses to medications and/or treatments, their experiences with a specific doctor/nurse/healthcare provider, the appropriateness of the cost of care that they are billed, and their satisfaction about customer services. Other studies (Mickelson 1997, Bansal et al 2010, Wang & Midha 2012, Torabi & Beznosov 2013) reported that by sharing this kind of information, social media users found benefits in many ways. These benefits include finding people who have similar health concerns, accessing more information resources about their health problems, finding supportive relationships from others social media users, and exchanging experiences with others regarding health problems.

On the one hand, people seem to value the benefits that they receive when they disclose their personal health problems online. On the flip side, the security and privacy concerns raised by this disclosure can be significant. Personal health problems have been viewed confidential and sensitive information, subject to HIPAA protection in a

commercial setting. This raises a conundrum where the organization has to keep the information secure, but the individual may freely disclose it.

Privacy concerns about disclosure of personal information online appear in many studies (USC 2009, Torabi & Bezosov 2013). A study by USC Annenberg School of Communication-Center (2009) reported that 88.2% of social media users express concern about the privacy of their personal information where their health information is of focal concern. A study by Torabi & Bezosov (2013) found that people may be reluctant to self-disclose their private information online because they are concerned about threats relate to their privacy and security. Those risks include privacy invasion, stalking, data re-identification, medical data misuse, and damaging personal data. However, there is research that suggests otherwise. One study suggests that social media users may not consider privacy to be an important issue (Gross &Acquisti 2005). It reported that for sites that encourage information disclosure like Facebook, it has been noted that the majority of the users have no trouble disclosing their personal information to a large group of people. 89% of these people admitted that they used their genuine names, and 61% of users gave a photograph of themselves for easier identification. This study also reported that the majority of users had not altered their privacy setting which allowed a large number of unknown users to have access to their personal information (the default setting originally allowed friends, friends of friends, and non-friends of the same network to have full view of a user's profile). Although it is possible for users to determine appropriate private settings for their profile, it appears that the default privacy settings were most commonly used. This has led to concerns that social media users are

displaying far too much information on social networking sites and may result in having serious impact on their privacy (Gross &Acquisti 2005).

For personal health information, Cambell stated that people these days often freely share online the kind of personal medical history that doctors and healthcare organizations are trying to protect (Cambell, reputation.com). People who share information often overlook the privacy risks of sharing personal health information online, and how damaging this information could become when it is posted online. As a result, it is not uncommon to see social media users post about their health problems in their social media networks.

We are interested in self-disclosure of personal health information because we found that only few studies addressed the issues that related to self-disclosure of health problems. There is no study that examined the social media users on personal health problem disclosure in their social media networks. A majority of the studies (Mickelson 1997, Kam & Chismar 2003,Abril & Cava 2007,Bansal et al 2010,Wang & Midha 2012,Torabi & Beznosov 2013) related to personal health information self-disclosure were conducted with social media users who participated in social network health communities or forums. Their foci were considerably different from the context that we are interested in studying.

In this study, we addressed the question why social media users disclosure their personal health problems in their social networks. In particular, we try to understand the factors that motivate them to do so, and the concerns they exhibit, when self-disclosing their health problems. Furthermore, we try to confirm whether the attitude of current

social media users regarding privacy concerns on self-disclosure of personal health problems in social media context has changed. In the following section we review and discuss relevant theories that can be applied to explain social media users' self-disclosure of medical information.

4.2 THEORETICAL BACKGROUND

4.2.1 Self-disclosure

According to Jourard (1971), self-disclosure is defined as the quantity (breadth) and quality (depth) of personal information that an individual provides to another. Knapp & Vangelisti (1992) go further and argue that it is not simply providing information to another person. Instead, it is the process of sharing information with others that somehow people would not normally know or discover. Two types of self-disclosure are mentioned by Laurenceau & Pietromonaco (1998) – factual disclosure and emotional disclosure. Factual disclosure reveals personal facts and data about an individual. Emotional disclosure reveals private feelings, opinions, and judgments. Both require sharing of possibly private information. Self-disclosure has been measured along five dimensions – intention, amount, valance, depth, and honesty and accuracy (Wheeless & Grotz 1976). Intention means people are aware of their self-disclosure. Amount refers to the frequency and duration of an individual's disclosure. Valance refers to the positive nature of the information being disclosed in communication. Depth represents degree of intimacy in communication. Honesty and accuracy refer to feelings, sensibilities, behaviors, and experience that one communicates information about ones. In our study, only self-disclosure intention was measured as a dependent variable.

4.2.1.1 Online Self-disclosure

Online self-disclosure has recently become a topic of interest for researchers. Many theories have been used to explain why people join social network sites, and voluntarily share their private information. A study by Chiu et al (2006) on knowledge sharing in virtual communities cited social cognitive theory by Bandura (1989). This is a learning theory that posits that people learn by observing others, and reciprocal interaction between personal factors and behaviors, and their social networks. Another theory cited is social capital theory by Platteau (1994). This theory posits that once communities are formed, members interact with others based on the expectation of reciprocation and trust. Social capital theory comprises three distinct dimensions; structural (the pattern of connections between actors), relational (the personal relationship that people have developed between others through an interactions), and cognitive (the resources providing shared presentation, interpretations and systems of meaning among parties) (Nahapiet & Ghoshal 1998). Chiu et al (2006) found that through social interactions, individuals are able to increase the depth, breadth, and efficiency of information sharing on social network. Many studies cite and use social exchange theory (Andrade et al 2000, Awad & Krishnan 2006, Posey et al 2010, Ko 2013). Social exchange theory is based the concept of potential benefits, and costs of self-disclosure. This theory posits that individuals calculate and then weight the benefits and risks before deciding to participate in online communities. Social penetration theory, originally proposed by Altman &Taylor (1973), is another theory that has been applied in self-disclosure. It relies on the essential concept of self-revelation. The theory states that people will progressively reveal more depth and breadth about themselves if they receive

reciprocal reaction from other parties. This theory coupled with social exchange theory was applied by Posey et al (2010) to study self-revelation online. They found that relationship reciprocation is the primary benefit of self-disclosure in an online community. Our study also relies on social exchange theory and social penetration theory.

4.2.1.2 Self-disclosure of health problems

Personal health information has generally been regarded as highly confidential and sensitive information. In recent years, many social networks have emerged that encourage people to share their private information. For health-related purposes, people use social media for a number of purposes. These activities include inform others about their sickness, express their feeling toward the disease, discuss with others about treatments they receive, receive support and suggestions from others, share their experiences that they have gone through regarding their health problems, increase fund raising, request donations, among others. Clearly, disclosing personal health problems online can provide the individual with some benefits. However, once the personal health problem is disclosed, this information may be abused or accessed without authorization. In addition, social network site personnel may release social network users' health information for their personal gain (Bansal et al 2010). This may be done legally if the users consent to broad information viewing and dissemination. Also, the sensitive information may be released through negligence and/or error. These unfavorable outcomes in disclosing personal health information increase individuals' privacy concern

(Bansal et al 2010). Andrade et al (2002) found that negative consequences regarding the privacy concern may result in avoiding disclosure.

4.2.2 Social Exchange Theory

Social exchange theory is rooted in utility theory from economics. This theory posits that people decide whether to interact with others based on evaluation of potential rewards and costs (Homans 1958). The theory assumes that rewards and costs drive relationship decisions while both parties take responsibilities for one another and depend on each other. Rewards may be material (economic) or symbolic (such as attention, advice, or status) and are generally defined as things that either have value or bring satisfaction and gratification to the individual. It is sometimes difficult to predict what specifically will serve as a reward, because the value may be different from one person to another. Costs can be considered in two ways including punishments, and rewards withdrawn (McDonell et al 2006). In social exchange theory, people calculate the overall worth by subtracting the costs from the rewards it provides (Monge & Contractor 2003). Rewards accrue when they outweigh cost.

Social exchange theory has been used to examine social media users in an online environment in order to explain users' willingness to reveal their personal information to be profiled online (Posey et al 2010). For health-related disclosure on social network, a study by Wang & Midha (2012) on people's self-disclosure of health information on social networks found that self-disclosure is the behavioral consequence of balancing between benefits, user needs, risks, and privacy concerns. Emotional intensity and disease type also tend to moderate user's self-disclosure of health social networks. A

study by Kam & Chismar (2003) on a self-disclosure model for personal health information found three motivating factors that determined people's intention to reveal their personal health problems – perceived privacy, quality of feedback, and context sensitivity. In our study we used factors that influence self-disclose online from previous studies and divided these factors into two groups; benefits and risks based on social exchange theory.

4.2.3   Social penetration theory

This theory was proposed by psychologists Irwin Altman and Dalmas Taylor in 1973 to gain an understanding of the closeness between two individuals. This theory explains that relational closeness as it occurs through self-disclosure proceeds gradually and orderly from superficial to intimate levels of exchange as a function of both immediate and forecast outcomes (Altman & Taylor 1973). The theory posits that relationships move to greater levels of intimacy over time, and the intimacy is achieved through depth and breadth of self-disclosure. Breadth of self-disclosure refers to discussing a range of topics, such as information about one's family, career, and so forth. Depth refers to the more central core of one's personality; that is, the more unique aspects of one's self (Altman & Taylor 1973).

To better understand self-disclosure, Altman & Taylor (1973) provided a metaphor that individuals are like onions as they possess many layers that describe an individual's personality where the outer layer is public self, and the core is private self. Thus, people do not automatically self-disclose important information about themselves at the beginning of a relationship, despite their desire for acceptance and relational

formation. People will wait until relationships among their partners progress to a deeper level before they reveal their private information. Like onions, the core is protected until the outer layers are shed or peeled off. The gradual process of revelation occurs in four stages. At the orientation stage people are engaged in small talk that follows the standards of social desirability, and norms of appropriateness. The next stage is the exploratory affective stage, where people start to reveal themselves, expressing personal attitudes on moderate topics but the whole truth may not be revealed. The affective stage is the third stage, where people start to talk about private and personal matters. In this stage the intimate relationship starts to form. The last stage is the stable stage, where the relationship reaches a plateau during which some of deepest personal thoughts, beliefs, and values are shared. There may optionally be a depenetration stage, where people break down the relationship, and withdraw disclosure. In this stage, the costs outweigh benefits. However, the relationship may not progress to this stage.

In terms of applying this theory on self-disclosure online, a study by Gibbs et al (2006) on online dating found that individuals with long-term goals of establishing face to face relationships engage in higher levels of self-disclosure. These people were more honest, tend to disclose more personal information, and make more conscious and intentional disclosures to others online. In addition, they found that increased self-disclosure led to greater perceived relational success in online dating. A study by Posey et al (2010) on self-disclosure on online community found that reciprocation encouraged people to reveal more of their information. Also they emphasized that reciprocation is a primary benefit of self-disclosure. However, a study by Whitty (2008) on online dating argued that there is far less opportunity for relationships to develop on an internet site in

the way proposed by the social penetration theory. He explained that in an internet site the profiles are setup in such a way to reveal both depth and breadth of information. . Furthermore, online dating users know that the more details they reveal about themselves, the more the chance that they will attract other viewers.. Therefore, he noted that this theory might not be appropriate for online revelation. However, we argue that in our study the context is different from the online dating context. Disclosing medical conditions is more likely to occur progressively after users are comfortable with the social network, and a level of intimacy has been built up. We asked people who are actively using social media whether they would reveal their personal health problems online. In our context, a viewer's response, which the social penetration theory calls reciprocation, encourage social media users to reveal more (Miura & Yamashimta 2007, Posey et al 2010, Ko 2013).

4.2.4   Combining the two theories

Posey et al (2010) posited that people assess interpersonal relationships based on rewards and costs, satisfaction and dissatisfactions, and gain and loss from interaction with others. The advancement of relationships is developed when people find more gains than losses and the relationship with others then progresses. Altman & Taylor (1973) indicated that the rewards and costs that the self-disclosure moves a relationship process a lot faster in the beginning stages but then it slows considerably which suggests that early rewards have strong impact on the beginning of the relationships reactions and involvement. However, in terms of long term relationship development, Altman & Taylor (1973) found that only people who continuously find positive rewards outweigh costs,

and share important matches of breadth and depth categories are able to develop a long term relationships. Thus, social penetration theory also involves rewards and costs that relate to social exchange theory (Altman & Taylor 1973, Posey et al 2010). We decided to integrate social penetration theory in our study and used it in terms of social benefits. Social benefits create reciprocity between social media users who post and their viewers. As a result the reciprocity and bonding encourages social media users to reveal and post about their personal health problems.

4.3 RESEARCH HYPOTHESES

The research model and hypotheses presented in Figure 4.1 is derived from social exchange theory (Homans 1958) and social penetration theory (Altman & Taylor 1973). Based on prior literature review, we added three more antecedents that determine self-disclosure of personal health problems beside benefits and risks of self-disclosure. They are social influence on social media users (Posey et al 2010), ease of use of social network sites (Hart et al 2008), and nature of health problems that relate to social acceptance of these health problems (Kam & Chrismar 2003, Bensal et al 2010). A detailed discussion of benefits and risks for self-disclosure of health information and three more antecedents that determine self-disclosure propensity and hypotheses is presented in this section.
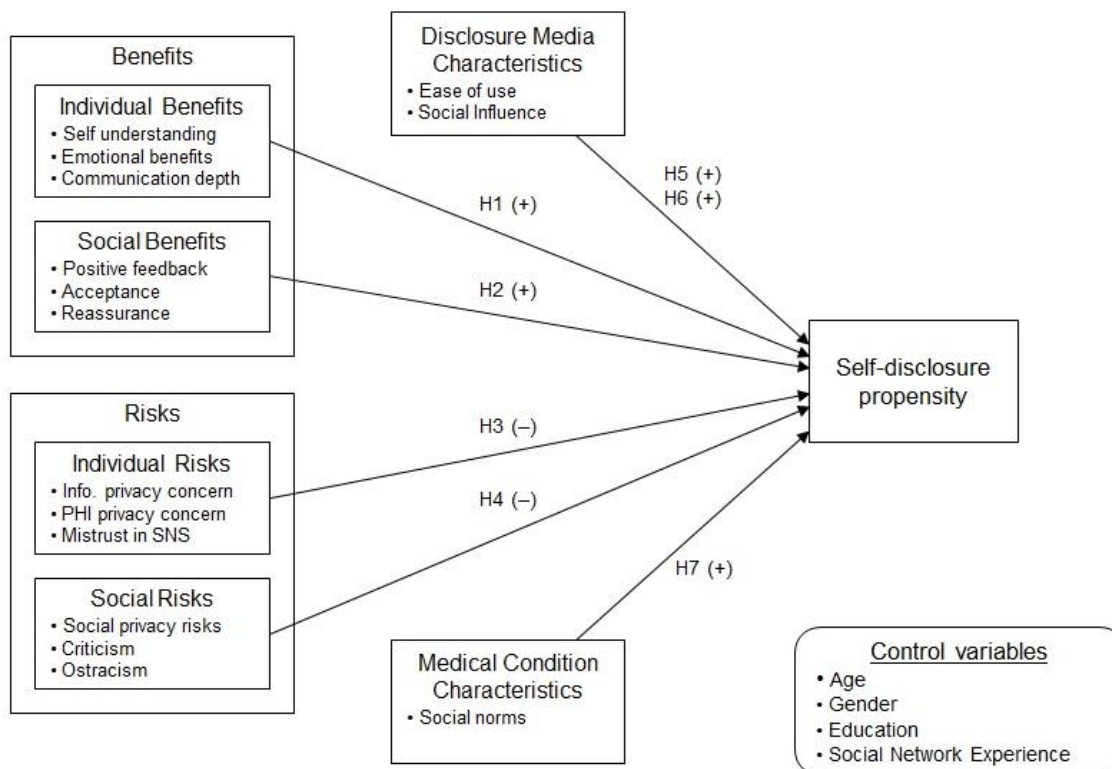
Figure 4.1: Research Model and Hypotheses

4.3.1 Self-disclosure Propensity

Self-disclosure propensity is defined as an individual's intention to reveal their personal health problems in a social media context. Personal health problems in our study varied quite a bit, including minor health problems such as cold, headache, dizziness, menstrual cramp, etc; psychiatric disorders such as depression symptoms and suicidal ideation; injuries and fractures; life threatening diseases such as acute myocardial infarction, hypertensive crisis, hypovolemic shock, etc; chronic illness such as diabetes, hypertension, etc; and serious illness such as cancer. The social media platforms that subjects used in our study also varied, including Facebook, Instragram, LINE, Twitter, Youtube, and the like. Although, the intention or motivation to post is different for each

individual, we scoped our study to focus on only intangible benefits rather than tangible benefits, i.e. post for requesting donations, and the like. Likewise, for losses, we focused on intangible losses, which involve psychological impacts or concerns. The intangible benefits and losses are typically addressed by users when they are considering posting.

4.3.2 Benefits of Self-Disclosure of Personal Health Problems

In the context of social exchange theory, benefits or rewards usually mean positive outcomes that the individual gains from connecting or communicating with others. Miura &Yamashimta (2007) described two types of benefits – individual benefits and social benefits.

4.3.2.1 Individual Benefits of Self-Disclosure of Personal Health Problems

One of the many individual benefits that can arise due to self-disclosure is an increased understanding of oneself (Pennebaker 1997; Pennebaker & Graybeal 2001; Miura &Yamashita 2007). Another benefit is the mitigation of psychological conflict by releasing negative emotion and stress relating to the situations that they have been exposed to. It can be expected that the more the individuals think they benefit from self-disclosure, the more they feel satisfied with revealing their personal information. This should reinforce their intention to reveal additional private information. Hollenbaugh (2010) found that communication in depth or communication to self also motivates people to post deeper and wider. Furthermore, through the process of writing, self-reflection and self-consciousness occur. These phenomena encourage people to organize their thought, and reflect on their actions influencing the amount, and depth of self-

disclosure on their post. Applied in a personal health information context, we also expect to see this following situation. Under the condition that people are stressed due to a medical condition, had they realized that their expression via social media could reduce the stress, help they gain self-understanding, and provide an opportunity to communicate in depth with themselves and others, they will express or post more. Thus, we hypothesis that;

Hypothesis 1: Individual benefits perceived by users through posting in social media have a positive effect on their self-disclosure propensity.

4.3.2.2 Social Benefits of Self-Disclosure of Personal Health Problems

Through self-disclosure, an individual becomes acquainted with others, and shares information with them to build intimate relationships (Altman & Taylor 1973). A situation of reciprocity is built (Jourard 1971). The feeling of reciprocity signals to an individual that his or her relation partners are willing to accept a certain level of vulnerability to continue the relationship and as a result, the individual will engage in future disclosure. Reciprocity also has a positive effect of fostering social bonding and intimacy. It can be very satisfying and drive several perceived benefits including, increasing social support and social integration, and bonding and bridging social capital (Posey 2010). In addition, it helps individuals whose post identify themselves as having a social existence (Miura &Yamashita 2007). Miura &Yamashita (2007) noted that in online communication, social benefit means the benefits gained by receiving positive responses from others who interact with the posted messages or photos. The positive response that the individual receives from online viewers include positive feedback (Kam

& Chismar 2003), reassurance (Miura &Yamashita 2007), and acceptance (Miura &Yamashita 2007). Positive feedback contains advice, information, or comments about the goodness or usefulness of the individual behaviors (Lu & Hsiao2007). Reassurance means the act or piece of information that makes someone less worried about their posts, and acceptance means agreement with the content or photos that are posted (Miura &Yamashita 2007).

Positive responses that social media users receive from their audiences have psychological effects to the users and influence their future self-disclosure (Ko 2012). Studies by Miura &Yamashita (2007), and Ko (2012) have suggested that users who post establish relationships between themselves and viewers while the positive feedback, acceptance and reassurance obtained increases support to the users who post (Tufekci 2008). Ko (2012) noted that the positive responses received on their actions influence the amount and depth of self-disclosure. Miura &Yamashita (2007) contend that the amount of positive responses that people who post received have an impact on social satisfaction. People who receive a lot of positive responses (e.g, sympathy, support, encouragement) feel more satisfied and motivated to continue posting. In applying personal health information disclosure, although there is no previous study mentioned about social benefits for people who reveal their personal health problems in a social network, we assume that these three social benefits of positive feedback, reassurance, and acceptance would apply as well. We expect that an individual who are motivated to post their messages or photos about their health problems will expect to receive these social benefits. The social benefits which they expected to receive will determine their self-posting. Thus we hypothesize that:

Hypothesis 2: Social benefits that are perceived by users through posting in social media have a positive effect on their self-disclosure propensity.

4.3.3 Risks of Self-Disclosure of Personal Health Problems

Risk has been defined as the possibility of loss (Yate 1992). Dinev & Hart (2006) noted that based in the social exchange theory context, the willingness to provide personal information depends on a risk-benefit analysis, in such a way that perception of higher risks and mistrust results in decreasing willingness to disclose personal information. However, the concept of risk concerns is not only confined with the individual privacy concern. In addition, Abril & Cava (2007), and Wang & Midha (2012) proposed that social privacy concerns that stem from the social aspect of information usage are other important factors that could affect individuals' decision on disclosure. The reason is because after people disclose their private information online, some changes or consequences may occur, which result in interfering with their normal lives. Hence, people may be concerned about both personal and social risk before making a decision about disclosure of private information. In our study, we included both individual risks which relate to concerns about privacy and mistrust, and social risks which relate to the social consequences after being disclosed in a social network.

4.3.3.1 Individual Risks of Self-Disclosure of Personal Health Problems

The concept of concern for privacy has long been a major factor that has held people back from releasing information online (Posey et al 2010). According to Malhotra et al (2004), privacy risk beliefs means the expectation that a high potential of loss is

associated with the release of personal information to others in the electronic community. People who perceive the costs of disclosing to be too high will refrain from disclosing any sensitive information. Smith et al (1996) noted that individual privacy concerns mainly include the following four arena: collection concerns, which stems from the collection of too much personal data; error concerns, which relate to the potential inaccuracy of personal data collected; secondary use concerns, which address the use of personal information by online companies for undisclosed purposes or the companies' advantages; and unauthorized access, which is a concern that the social network sites that will fail to protect access to personal information.

There is much prior research that addresses the privacy concern. A study by Dutton & Helsper (2007) with U.K. internet users, found that 70% of U.K. internet users agreed with the statement that "people who go on the internet put their privacy at risk," and 84% agreed that "personal information is being kept somewhere without my knowledge". A recent study by Dutton et al (2013) reported that attitudes toward privacy have been relatively stable for the past six years. After a spike of concerns reached 59% in 2007, belief that the Internet threatens privacy had been dropped and it ranged from 37% in 2009 to 47% in 2013.

For health information privacy concern, issues that people are concerned with are reported in a survey by PwC (2012). It found that 65% of participants were concerned whether their personal health information will be shared in public, 57% were concerned about information being hacked or leaked, and 41% were concerned about health insurance coverage being impacted due to information shared. Thus in disclosing

personal health problems, the health information privacy issue is another issue that needs to be concerned apart from the others personal information. Thus in our study of privacy risks, we considered both personal information risks and health information risks as factors that threaten self-disclosure of personal health problems in social networks.

Another study noted that privacy concern is not an independent construct affecting online behavior but a contributor to trust (Joinson et al 2010). The link between privacy concern and trust was investigated in a study by Metzger (2004). Similarly, Chellapppa & Sin (2005) found that the consumers' intention to use online personalized services was influenced by both trust and concern for privacy. Thus in our study we integrated privacy concern and trust in the same construct.

Trust is another factor that determines successfulness of online disclosure (Piccoli & Ives 2003) and it is perhaps the most important influence on information disclosure (Metzger 2004). In social exchange theory, trust is believed to be used in the calculation of perceived cost (Roloff 1981). High trust leads to a perception of low cost, and vice versa. Studies by Posey et al (2010), and Bansal et al (2010) found that trust had positive effect on online self-disclosure. Metzger (2004) contended that trust is a predisposing factor for self-disclosure because it reduces perceived risks involved in revealing personal information. People who have more trust with social network sites, and more trust on others in the social network sites tend to reveal their private information than those who do not trust. Based on this, we hypothesized that;

Hypothesis 3: Individual risks that are perceived by users through posting in social media have a negative effect on their self-disclosure propensity.

4.3.3.2 Social Risks of Self-Disclosure of Personal Health Problems

Wang & Midha (2012) noted three elements related to social privacy risks in health-related information disclosure. These are information processing, information dissemination, and invasion. Information processing refers to the use, storage, and manipulation of data that has been collected. Through the information processing, personal information data, and personal health data is aggregated and results in identifying for those who post (Solove 2006). Information dissemination is a harm that consists of the revelation of personal data or the threat of spreading information i.e breach of confidentiality, disclosure, exposure, increased accessibility, blackmail, etc (Solove 2006). These dissemination effects may destroy the reputation of or bring about disgrace to social network users. Invasion is viewed as a harm since the social network users' daily activities or social circles are intruded or interfered by others (Solove 2006). In the case of personal health problems revelation, the viewers who intrude people who post might be the people who are completely unknown but would like to know the users who post because of their health problems (Wang & Midha 2012). Therefore, considering these three elements in terms of disclosure of personal health problems, social network users may be afraid whether they may be identified by others, particularly when the consequences of being identified may cause embarrassment or other harm. In addition, the revelation of personal health problems may cause criticism and ostracism to those who post. In our study, we included social privacy risk which is a risk of being invaded by others, and criticism and ostracism which are the effect that an individual is deliberately excluded from a social relationship or social interaction as factors that

threaten self-disclosure intention of personal health problems in social media. Thus, we hypothesized that;

Hypothesis 4: Social risks that are perceived by users through posting in social media have a negative effect on their self-disclosure propensity.

4.3.4 Ease of Use of Social Media

Ease of use in this context means users' perception about the level of difficulty encountered in social media use. A study by Chen & Bryer (2012) noted that ease of use is the most important factor that encouraged participants to engage in creative and social connections. In addition, ease of use makes users to be more comfortable and encourages them to use and post more. This may result in more personal information revelation (Hart et al 2008). Joinson et al (2010) also stated that as long as the users are comfortable with social media, they will use the social media, and reveal their private information more as their experiences and trust increases. Thus we applied these findings to hypothesize that

Hypothesis 5: Ease of use of social media has a positive effect on self-disclosure propensity.

4.3.5 Social Influence

Deutsch & Gerard (1955) defined that social influence is the degree to which an individual's beliefs, attitudes and/or behaviors are influenced by others in his or her environment. Social influence regulates group member's actions. Social psychologists added that people tend to adopt groups' attitudes, and act in accordance with groups'

expectations and groups' behaviors based on affiliation needs, and social comparison processes (Festinger 1954); social pressures toward group conformity (Silberman 1976, Skinner & Fream 1997, Chan et al 2005); and the formation, and acquisition of reference group (Newcomb 1943, Skinner & Fream 1997, Perkins 2002).

A study by Cialadini (2009) noted the influence by others has been shown to encourage individuals to engage in an activity if they know or believe that others in their environment are also engaging in that activity. In addition, they are drawn to others who share similarities, particularly those who praise them (Cialadini 2009). For social media users, Posey et al (2010) noted that individuals who are easily influenced by surrounding people are likely to use these principles as a basis for their disclosure activity in electronic communities. Individuals may alter the frequency and nature of their disclosures to become more similar to those in their environment, and thereby reach conformity by increasing their perceptions of attractiveness. Those who are susceptible to social influences may increase the rate of their disclosures and the level of honesty in their disclosures in order to increase their attractiveness, and likability among their online community and friends (Posey et al 2010). Thus we hypothesized that;

Hypothesis 6: Social influence has a positive effect on self-disclosure propensity.

4.3.6 Nature of the Health Problems

The nature of health problem is another important factor that determines an individual's intention to post about their personal health problems. In our study, to examine this factor we ask respondents' perception about people posting three specific

health problems – stigmatized health problems, psychiatric problems, and chronic health problems. Stigmatized health problem is a health problem that causes a mark of disgrace that sets a person apart from his/her group. When a person is labeled by such an illness, he/she is seen as part of a stereotyped group. Then, the negative attitudes are created accordingly by the group and result in prejudice which leads to negative actions and discrimination (Albrecht et al 1982). Stigmatized health problems include sexually transmitted diseases, AIDS, leprosy, certain skin diseases, epilepsy, certain autoimmune diseases, disability, obesity, etc (Albrecht et al 1982, Sartorius 2007). Psychiatric problems include all mental problems, and drugs addiction. Chronic health problems indicate that the diseases persist at least three months or more, by the definition of the U.S. National Center for Health Statistics. Chronic diseases generally cannot be prevented by vaccines or cured by medication, nor do they just disappear. Examples of chronic diseases are cancers, cardiovascular diseases, arthritis and related conditions, chronic respiratory diseases, metabolic syndromes, autoimmune diseases, etc (Schoenborn & Heyman 2009). In our study, we asked respondents to focus on these three health problems influencing on self-disclosure intention in social media because these conditions are sensitive conditions, and last long so that individuals may concern more before posting.

Previous studies about self-disclosure on sensitive diseases have mixed results. In a study by Wang & Midha (2012) that compared the self-disclosure intention on an online health-related site among users with chronic conditions and non-chronic conditions found that people with chronic conditions have higher intention to post more than people with non-chronic conditions. In contrast, a study by Tisnado et al (2006) that

compared the concordance rate between patients' self reports and actual health records noted that people who perceived that their health problems contain sensitive information were concerned about their health information release and tend to conceal their information. Another study found that people who perceived their health status were poor would perceive that their health information were too sensitive, and resulted in increasing privacy concerns about their personal health information (Bansal et. al. 2012). This had led to the effect of decreasing users' intention to disclose their personal health information in health-related websites.

In our study, based on the fact that we usually see people post about their health problems in their social networks, i.e. Facebook, Instragram, LINE, and we doubted whether the attitude of social media users regarding these health problems has been changed to be more positive and acceptance to those who post. Thus, we argue that regarding these three health conditions, people who accept these diseases posting in social networks and think that these diseases are encouraged to post are more willing to self-post their personal health problems. Thus we hypothesized that

Hypothesis 7: The nature of health problem has a positive effect on self-disclosure propensity.

4.3.7 Control Variables

Control variables are factors that have their potential to influence a dependent variable. Thus they need to be identified or standardized in order to reduce errors to the results (Freeman 1965). Based on previous studies about self-disclosure online by

Valkenburg & Peter (2007), and Hollenbaugh & Everett (2013), age, and gender are considered as control variables. Valkenburg & Peter (2007), and Hollenbaugh & Everett (2013) found that younger participants were more likely to disclose a larger amount of information on a variety of topics than older participants and women were more likely to disclose a larger amount of information about a variety of topics than men. A study by Gibbs (2006) added education as another control variable as the less educated people affected self-disclosure online. A study by Bateman et al (2011) added SNS (social networking sites) experience as a control variable because SNS experience may influence self-disclosure online. Considering these 4 control variables that have an impact on previous study, we expected that these factors may interfere our results as confounders as well. Thus we applied these age, gender, education, and SNS experience as control variables in our study.

4.4 RESEARCH METHODOLOGY

The following section describes the research methodology involved in this study, including sampling procedure, the development of our constructs, and scales, and the analytical procedures.

4.4.1 Instrument Development

The survey questionnaire adopted in this study comprised two parts. The first part included general demographic questions (i.e. age, gender, education, etc); internet experience (i.e. number of hours using the internet); social media experience (i.e.

numbers of social media that currently use, numbers of connection in social media,

posting frequency); and health-related questions (i.e. specify current health problems).

The second part included the scales of each construct in the research model, which

consisted of 66 self-reported items for the 15 research constructs. Detailed lists of all

items are included in Appendix A. Questions related to benefits and risks of personal

health problem disclosure were operationalized as formative second-order construct

consisting of 4 dimensions including personal benefits of personal health problem

disclosure, social benefits of personal health problem disclosure, personal risks of

personal health problems disclosure, and social risks of personal health problem

disclosure. Table 4.1 provides a summary of operationalized definitions of the four

constructs. Other constructs that measure ease of use of social media, social influence on

social media use, and nature of health problems are first-order construct. All

questionnaire items used a seven-point Likert-type scale ranging from 1 (strongly

disagree) to 7 (strongly agree). Each construct uses multi-item scales.

Table 4.1: Research Constructs and Operational Definitions

Research constructs	Operational definitions	Operational items	Item sources
Individual benefits (Miura & Yamashita, 2007)	User's better understanding on him/herself regarding posting personal health information using his/her social network	-Self understanding -Communication in depth -Emotional benefits	Pennebaker(1997) Hollenbaugh(2010) Miura & Yamashita(2007)
Social benefits (Altman & Taylor 1973)	User perceives that he/she receives empathy, or sympathy from his/her social community	-Positive feedback -Acceptance -Reassurance	Kim & Chismar (2003) Miura & Yamashita (2007) Miura & Yamashita (2007)

| Individual risks (Posey et al 2010) | User expects the loss of his/her personal information regarding posting personal health information using his/her social network | -Private information privacy concern -Health information privacy concern -Mistrust in social network sites | Posey et al (2010) Wang & Midha (2012) Bensal et al (2010) |
| Social risks (Wang & Midha 2012) | User expects about negative reactions of surrounding people, and his/her social community | -Social privacy risk -Criticism -Ostracism | Solove (2006) Wang & Midha (2012) Wang & Midha (2012) |

4.4.2 Second-order Factor Model

A second-order factor model is an extension of factor analysis statistical method consisting of repeating steps factor analysis. It enables the researcher to see the hierarchical structure of studied phenomena (Gray 1997). We applied second-order models in this study because we found that our primary factors order meet two criteria: the lower order factors are substantially correlated with each other, and there is a higher order factor that is hypothesized to account for the relations among the lower order factors (Chen et. al. 2005). In addition, in this study a second-order factor model has several potential advantages over a first-order factor model. First, the second-order model puts a structure on the pattern of covariance between the first-order factors together, and allows us to explain the covariance with fewer parameters (Reise et al 1993). Second, a second-order model separates variance due to specific factors from measurement error, leading to a theoretically error-free estimate of the specific error. Third, a second order model provides useful simplification of the interpretation of complex measurement structures for our study (Eid et al 2003).

4.4.3 Pretest

A pretest was used to validate the instrument. Ten participants who had at least one year of social media experience and were using social media during the pre-tested period were enrolled, of which four were expert researchers from a communication school who have experience in questionnaire design. The participants were asked to comment on wording use, and content of each questionnaire item. Some of the questionnaire items were revised or removed prior to administer a final survey. The survey was conducted using the Qualtrics survey tool.

4.4.4 Study Context and Samples

This study was conducted using a survey method. An online questionnaire was sent to the students at a Midwestern university, and to other students across the US through their student association. Students who completed the survey were also asked to share the link of the survey to their friends, and families who were at least 18 years old. A further disseminating invitation for the survey was conducted voluntarily by participants. Only participants who were actively using social media during a study period were enrolled in the study. To do so, we included a question that asked whether respondents were using social media during the study period. Only respondents who said they were using social media could complete the remaining questions. There was no incentive offered to respondents.

4.5 ANALYSIS AND RESULTS

We use SPSS 21.0 for performing descriptive statistics analysis, factor analysis, and construct validity, and AMOS 21.0 for performing structural equation modeling analysis (SEM). Structural equation modeling was used to examine model causality. In our model, antecedents that are the first-order constructs include; ease of use (EU), social influence (SI), and nature of health problems (NH), and the second-order constructs include; individual benefits of personal health problems disclosure (IB), social benefits of personal health problems disclosure (SB), individual risks of personal health problems disclosure (IR), and social risks of personal health problems disclosure (SR).

Data for this study were collected via an online survey. A total 520 subjects who were using social media completed a survey. After discarding the incomplete and un-engaged data, there were 374 usable responses (71.9%). A summary of the demographic characteristics of participants is provided in Table 4.2.

Table 4.2: Demographic Characteristics of Respondents

	Survey Participants (N=374)	
	Frequency	Percent
Gender		
Male	176	47.1%
Female	198	52.9%
Age		
18-24	98	26.2%
25-34	205	54.8%
35-44	53	14.2%
45-54	12	3.2%
55-64	5	1.3%
65 and over	1	0.3%
Education		
Secondary education	1	0.3%
High school/GED	20	5.3%

Some colleges on degree	20	5.3%
2-year colleges degree(associates)	2	0.5%
4-year colleges degree(BA,BS)	82	21.9%
Master's degree	154	41.2%
Doctoral degree	76	20.3%
Professional degree(MD,JD)	17	4.5%
Other	2	0.5%
Social network sites use		
1 site	54	14.4%
2-3 sites	215	57.5%
4-5 sites	76	20.3%
6-10 sites	27	7.2%
>10 sites	2	0.5%
Social networks use(yr)		
<1 yr	5	1.3%
1-2 yr	20	5.3%
3-5 yr	204	54.5%
6-10 yr	126	33.7%
>10 yr	19	5.1%
Number of people in social network connection		
<50	18	4.8%
50-199	71	19%
200-499	153	40.9%
500-999	87	23.3%
>=1000	45	12%
Social networks use (hr/day)		
< 1hr	59	15.8%
1-3 hr	212	56.7%
4-6 hr	76	20.3%
7-12 hr	22	5.9%
>12 hr	5	1.3%
Health problems		
Yes	103	27.5%
No	217	72.5%

We found female social media users (52.9%) slightly outnumbered their male counterparts (47.1%). Most participants were aged 25-34 (54.8%). Most respondents were master degree students (41.2%), 4 year college degree students (21.9%), and PhD. students (20.3%). Most participants said that they joined 2-3 social network sites (57.5%), joined these sites for 3-5 years (54.5%), used these sites for 1-3 hrs per day

(56.7%), and had 200-499 friends in their connections (40.9%). A majority of participants said they did not have a current health problem (72.5%).

4.5.1 Measurement Model

We assessed the psychometric properties of a model though internal consistency, convergent validities, and discriminant validities. Internal consistency is indicated using the composite reliability (CR) and Cronbach's alpha (Cronbach 1951, Fornell& Larcker 1981). The Chronbach's alpha and CR score above 0.7 indicate good internal consistency of the data (Cronbach 1951, Fornell & Larcker 1981). In addition, for acceptable chronbach's alpha, George & Mallery (2003), and Kline (2000) noted that $0.7 \leq \alpha < 0.9$ is good, $0.6 \leq \alpha < 0.7$ is acceptable, and $\alpha < 0.6$ is poor. Thus in our study, we accepted Chrobach's apha at 0.6, and above. Convergent validity is demonstrated using these criteria; item loadings are in excess of 0.7 (Gefen et al 2000), average variance extracted (AVE) for each construct exceed 0.5 (Fornell & Larcker 1981) and/or the average of all factor loadings from the same constructs is greater than 0.7 (Fornell & Larcker 1981). Hair et al. (2010) argued Gefen et al (2000) that regardless of using only one cut-off score at 0.7 for all items, the sufficient or significant loadings are depended on sample size, and with the samples more than 350 as our study, the factor loadings value greater than 0.3 is considered sufficient. The discriminant validity is demonstrated if the variables load significantly only on one factor (Hair et al. 2010, Gefen et al 2000) and the square root of the AVE for each construct is larger than the inter-construct correlation (Fornell & Larcker 1981). If cross-loadings exist, the discriminant validity should meet the criteria that the cross-loading coefficients on loading constructs should differ by more

than 0.2, no cross factor loading loads on other items more than 0.4 (Gaskin 2010a), and a correlation factor between constructs in factor correlation matrix should not exceed 0.7 (Gaskin 2010a).

4.5.2 First order factor analysis

4.5.2.1 Exploratory Factor Analysis (EFA)

Prior to doing SEM analysis, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) approaches were performed to examine the internal reliability of a measure (Newsom 2005), and construct validity tests were conducted to check the degree of a measure whether it can test what it claims (Brown 1996). Maximal Likelihood (ML) was used in this study as this method is generally recommended and it gives good results when the data is distributed normally. In addition, ML is the closet method to CFA among extraction method and it is recommended if the study is heading to perform CFA (Cudeck & O'Dell 1994). Thus, we used ML for analyzing our data. Prior to applying ML, the normality of the observed variables were tested. Following the rules of thumb suggested by Curran et al. (1996) mention that moderate normality thresholds of 2.0 for skewness and 7.0 for kurtosis is acceptable when assessing multivariate normality. However, a recent research argued that ML estimation method can be used for data with minor deviations from normality (Raykov & Widaman, 1995). Thus, in our study we followed these two assumptions by using cut-off thresholds of 2.0 for skewness and 7.0 for kurtosis and allowed minor deviations from normality. In addition, rotation is applied to rotate factors in multidimensional space in order to arrive at a solution with the best simple structure. The oblique rotation, Promax, was used in this study since it produces

solutions with better simple structure than orthogonal rotation, and oblique rotation allows factors to correlate, and produces estimates of correlations among factors (Fabrigar et al 1999). Factor loadings and cross-loadings are the results that produced from EFA. Generally, factor loadings load cleanly on the constructs where they are intended to load and do not cross-load on the construct to which they should not load (Straub et. al 2004).

Prior to performing EFA, normality and the appropriateness of the data were performed. Normality testing in our data showed that according to Carren et al (1996) rule of thumb for skewness or kurtosis, there was no item that has skewness or kurtosis. The appropriateness of data was performed to indicate that the variables relate to one another enough to run a meaningful EFA (Gaskin2012a). The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.901, indicated marvelous (Gaskin 2012a) and Bartlett's Test of Sphericity is significant ($p < 0.001$), indicated the relation of the variable (Gaskin 2012a). IP (personal information privacy) 4 (factor loading 0.149), IP5 (factor loading 0.145), IP6 (factor loading 0.087), and SI (social influence) 1 (factor loading 0.196) were removed due to poor factor loading. NH (nature of health problems)3, and NH5 were removed due to high cross loading (the difference between factor loadings in its constructs and other constructs is less than 0.2, Gaskin 2012a). Further, PF (positive feedback) 1, PF2, AT (acceptance) 3, and HP (health information privacy concern) 3 were removed due to borderline poor factor loading and borderline cross factor loading. Two constructs, MC (social media privacy control), and MT (mistrust in social network sites) were removed due to high cross loading with other constructs. After these items and two constructs were removed from the analysis, the results were improved. The

results of the EFA (Table 4.3) indicated the items used in this study met the requirement

for convergent and discriminant validity. The criteria for convergent validity was met

because all factors loaded highly on their constructs (Table 4.3) and each item loaded

significantly (p<0.01) on its own construct, and had higher correlation on its own than

others (Loch et al 2003). The significance of each item to its own construct was

confirmed by the correlation analysis. Also, the average variance extracted (AVE) for

each construct that exceeded 0.5 (Table 4.5), confirmed convergent validity. The criteria

for discriminant validity was met because all factors load higher on their own constructs

(Table 4.3), load significantly higher on their own constructs, correlation factor between

constructs in factor correlation matrix did not exceed 0.7 (Table 4.4), and the square root

of the AVE for each construct was larger than the inter-construct correlation (Table 4.5).

For the internal consistency, the results of Cronbach alpha score are provided in Table

4.3, and the results of CR for each item are provided in Table 4.5.

Table 4.3: Results of Exploratory Factor Analysis (Loadings and Cross loadings), and Cronbach Alpha Scores for First Order Factors

	Factor														
	CD	SC	PF	NH	SI	IP	RE	SU	EB	EU	SP	SO	HP	INT	AT
Cronbach	.91	.89	.84	.87	.91	.85	.87	.87	.85	.78	.81	.85	.64	.92	.74
CD1	.56	-.01	-.08	.08	-.02	.08	.02	-.06	.17	.07	-.10	.00	-.01	.19	-.05
CD2	.67	-.08	.04	.01	.12	-.08	.11	.02	-.08	.05	.01	.07	.10	-.02	-.22
CD3	.97	.05	-.02	-.05	-.03	.05	.01	-.16	.07	.03	.04	-.05	-.02	-.04	.00
CD4	.72	.03	-.04	.00	-.03	-.01	-.05	.05	.03	-.04	.02	.04	.08	.00	.01
CD5	.86	.06	-.02	-.00	-.10	-.01	.01	.01	-.01	.05	-.02	-.05	-.01	.01	.14
CD6	.85	.01	.02	.00	-.07	-.01	-.08	-.04	-.01	-.04	.01	.02	-.17	-.01	.13
CD7	.73	-.07	.05	.10	.09	-.08	-.04	.10	-.18	-.07	-.03	-.01	.13	.03	.04
SC1	.10	.79	-.13	-.04	-.07	.02	.10	.01	.00	-.04	.05	-.06	.02	-.02	.11
SC2	-.04	.75	.13	-.04	-.05	-.05	-.07	.03	.09	.07	.02	.03	.01	.03	-.12
SC3	.02	.91	-.01	.01	.11	.06	-.08	.05	-.09	-.00	-.05	.06	-.12	-.04	.05

SC4	-.03	**.86**	.03	.08	.02	-.05	.05	-.04	.02	.01	.09	-.07	.01	.03	-.06
PF3	-.08	.00	**.69**	.10	.01	.05	.01	-.01	-.03	.02	-.06	.00	-.00	.05	.03
PF4	-.05	.02	**.81**	.03	-.02	.02	-.08	.05	.01	-.01	-.06	-.01	.01	.02	.09
PF5	.14	-.02	**.72**	-.10	-.04	-.03	.03	.03	-.05	-.05	.10	.06	-.07	-.05	-.06
PF6	-.02	-.00	**.81**	.03	-.04	-.03	.07	-.11	.04	.01	.02	-.05	.01	.01	.01
NH1	.18	-.13	-.05	**.37**	.10	-.03	.03	.05	.06	.07	.22	.06	-.16	.04	-.01
NH2	-.07	.01	.06	**.85**	.04	-.00	-.03	-.05	.08	.03	.09	-.03	-.08	.04	-.00
NH4	.04	-.02	-.01	**.91**	-.04	.07	.09	-.02	-.02	-.05	-.01	.02	.02	-.01	-.05
NH6	.07	.07	.01	**.90**	-.01	-.01	-.00	.06	-.01	-.02	-.13	-.02	.06	-.11	.03
SI2	.07	.04	.00	-.09	**.80**	.03	.05	-.07	.07	.02	-.06	-.04	.00	.00	-.05
SI3	.02	-.03	-.04	.06	**.97**	-.01	-.06	-.05	-.03	.01	.08	-.02	-.01	-.04	.08
SI4	.04	.02	-.03	.02	**.80**	-.02	-.03	.02	-.02	-.01	-.03	.02	.02	.09	.02
IP1	.10	-.03	.01	.00	.04	**.73**	-.03	-.07	-.11	-.03	-.03	.08	.13	-.02	.00
IP2	-.06	-.02	-.06	-.02	-.01	**.89**	.05	.03	.00	.06	.04	.02	-.04	-.02	.03
IP3	-.07	.03	.05	.07	-.03	**.79**	-.02	.04	-.01	-.02	-.01	-.04	.02	.06	.04
RE1	-.10	-.10	.15	.01	.04	-.06	**.50**	.03	.06	.09	.03	.04	.05	.03	.20
RE2	-.00	-.01	.03	.03	-.03	-.00	**.92**	-.01	.01	-.01	-.00	.01	.00	-.02	-.02
RE3	-.01	.04	-.02	.05	-.06	.01	**1.00**	.02	-.05	-.03	-.00	-.03	-.00	.05	-.00
RE4	.27	.02	.08	-.10	.14	.04	**.38**	.09	-.02	-.02	-.02	.06	-.18	-.14	.03
SU1	.06	.01	.02	.02	-.06	-.10	-.08	**.67**	-.05	.14	-.03	.07	.17	.00	.12
SU2	-.04	.06	-.04	.02	.03	-.00	.11	**.93**	-.11	-.01	-.05	-.07	-.02	.06	-.06
SU3	-.00	-.04	-.01	-.03	-.07	.07	-.02	**.88**	.13	-.06	.07	.02	-.08	-.01	-.01
EB1	.21	.01	.10	-.10	.07	.11	.06	.11	**.44**	.06	-.04	-.06	.02	.06	-.16
EB2	.11	.05	.03	-.01	.15	-.03	.05	.10	**.50**	.01	-.12	-.02	.15	-.10	-.02
EB3	.26	-.05	-.05	-.01	.01	.03	-.05	.18	**.53**	-.10	.08	-.06	-.05	-.09	.02
EB4	.02	.03	-.06	.04	-.08	-.07	.03	-.13	**.90**	.03	-.06	.03	.08	.07	.06
EB5	.06	-.02	.07	.05	.04	-.05	-.09	.03	**.72**	-.06	.05	.05	-.03	-.01	.07
EU2	-.05	.01	-.03	-.01	-.00	.02	.00	-.00	-.03	**.84**	-.02	-.00	.05	-.04	.05
EU1	.07	.01	.02	-.01	.02	-.00	-.03	.02	-.02	**.81**	.05	.01	-.10	-.02	-.01
SP1	.06	.06	.01	-.05	-.05	.01	.07	-.04	-.03	.05	**.68**	.01	.19	.02	-.04
SP2	-.05	.12	.00	.04	.04	.00	-.06	.04	-.04	-.02	**.77**	-.01	.09	.01	-.02
SO1	.02	.09	.01	-.04	-.04	.06	-.02	-.01	.03	.02	-.01	**.96**	-.04	-.03	-.03
SO2	-.07	.37	-.05	.06	.02	-.05	.05	-.04	.02	-.07	.00	**.53**	.07	.04	.04
HP1	.06	.03	.11	.02	.04	.20	-.07	-.01	-.02	-.04	.09	-.04	**.52**	-.07	-.07
HP2	-.02	-.06	-.09	-.04	-.02	.01	.02	.01	.11	-.01	.20	-.00	**.66**	.01	.11
INT1	.20	-.02	.01	-.02	.23	.02	-.02	.05	-.05	-.01	-.04	.03	-.01	**.62**	.01
INT2	.05	.02	.02	-.05	.12	.00	.01	.03	.03	-.04	.04	-.03	-.02	**.85**	-.00
AT1	.07	-.01	.03	.05	-.01	.06	.02	.01	.10	.06	-.08	-.00	.06	-.02	**.63**
AT2	.10	.03	.12	-.13	.12	.01	.15	-.03	-.02	-.04	.06	-.02	.04	.03	**.54**

Note CD= Communication in depth, SC = Social Criticism, PF= Positive feedback, NH = Nature of health problems, SI = Social influence, IP = Information privacy concern, RE =Reassurance, SU =Self understanding, EB = Emotional benefit, EU= Ease of Use, SP = Social privacy risk, SO = social ostracism, HP= Health information privacy concern, INT = self-disclosure propensity, AT = Acceptance

Table 4.4: Factor Correlation Matrix of First Order Factors

Factors	CD	SC	PF	NH	SI	IP	RE	SU	EB	EU	SP	SO	HP	INT	AT
CD	1.00	-.10	.23	.27	.66	-.04	.48	.56	.64	.33	-.03	.18	-.07	.51	.42
SC	-.10	1.00	.18	-.07	-.09	.19	.03	.01	-.04	-.06	.46	.49	.32	-.14	.01
PF	.23	.18	1.00	.29	.26	.19	.59	.36	.40	.18	.06	.14	.35	.21	.42
NH	.27	-.07	.29	1.00	.29	-.03	.25	.23	.38	.18	-.09	.02	-.05	.37	.16
SI	.66	-.09	.26	.29	1.00	-.01	.44	.41	.55	.35	-.14	.11	-.03	.65	.36
IP	-.04	.19	.19	-.03	-.01	1.00	.06	.04	-.01	.10	.17	.01	.36	-.09	.08
RE	.48	.03	.59	.25	.44	.06	1.00	.50	.53	.22	.07	.19	.09	.28	.57
SU	.56	.01	.36	.23	.41	.04	.50	1.00	.64	.39	.11	.20	.17	.30	.30
EB	.64	-.04	.40	.38	.55	-.01	.53	.64	1.00	.32	-.03	.08	.08	.43	.39
EU	.33	-.06	.18	.18	.35	.10	.22	.39	.32	1.00	-.09	.01	.10	.33	.20
SP	-.03	.46	.06	-.09	-.14	.17	.07	.11	-.03	-.09	1.00	.32	.32	-.19	-.02
SO	.18	.49	.14	.02	.11	.01	.19	.20	.08	.01	.32	1.00	.16	-.01	.15
HP	-.07	.32	.35	-.05	-.03	.36	.09	.17	.08	.10	.32	.16	1.00	-.03	.04
INT	.51	-.14	.21	.37	.65	-.09	.28	.30	.43	.33	-.19	-.01	-.03	1.00	.25
AT	.42	.01	.42	.16	.36	.08	.57	.30	.39	.20	-.02	.15	.04	.25	1.00

Table 4.5: Result of Means, SDs, Reliabilities and Correlations of First Order Factors

	#of Items	mean	SD	CR	AVE	Range of factor loadings	INT	CD	SC	PF	NH	SI	IP	RE	SU	EB	EU	SP	SO	HP	AT
							Correlations														
INT	2	2.75	1.63	.92	.85	.88-.96	**.92**														
CD	7	2.67	2.67	.91	.60	.70-.85	.69	**.77**													
SC	4	4.49	1.43	.89	.68	.77-.88	-.11	-.06	**.83**												
PF	4	4.76	1.35	.86	.61	.66-.83	.24	.20	.17	**.78**											
NH	4	3.84	1.53	.90	.70	.64-.90	.38	.38	-.05	.31	**.83**										
SI	3	2.84	1.69	.91	.78	.85-.91	.80	.68	-.07	.20	.35	**.88**									
IP	3	5.16	1.54	.86	.67	.76-.88	-.08	-.05	.20	.19	-.02	-.02	**.82**								
RE	4	3.71	1.38	.87	.63	.62-.85	.42	.52	.04	.62	.36	.47	.07	**.79**							
SU	3	3.79	1.66	.80	.69	.75-.89	.40	.54	.04	.31	.29	.37	.05	.55	**.83**						
EB	5	3.33	1.64	.87	.57	.72-.78	.60	.75	-.01	.40	.44	.63	.00	.64	.71	**.75**					
EU	2	4.69	1.73	.80	.67	.71-.92	.33	.35	-.02	.13	.18	.33	.09	.24	.37	.34	**.82**				
SP	2	4.46	1.40	.82	.69	.80-.86	-.19	-.10	.57	.09	-.10	-.17	.26	.04	.11	-.05	-.05	**.83**			
SO	2	3.94	1.45	.86	.75	.81-.92	-.03	.07	.71	.15	.02	.04	.09	.17	.13	.06	-.04	.45	**.87**		
HP	2	4.90	1.55	.70	.50	.67-.70	-.08	-.05	.36	.33	-.06	-.06	.52	.14	.19	.15	.03	.62	.26	**.69**	
AT	2	3.82	1.52	.75	.61	.74-.80	.46	.57	.06	.54	.23	.50	.16	.77	.41	.59	.25	-.01	.13	.18	**.78**

Bold scores = the square root of AVE

4.5.2.2 Confirmatory factor analysis

Confirmatory factor analysis (CFA) was performed using AMOS 21 to check on the construct, and identify the model fitness. The Maximum Likelihood (ML) estimation method was employed. The overall fit indices suggested a good fit of the model to the data; most of the indices were greater than the recommended cut-off scores (see Table 4.6).

Table 4.6: Confirmatory Factor Analysis and Fit Indices of First Order Factors

	χ^2(DF)	χ^2/DF	NFI	IFI	TLI	CFI	GFI	AGFI	SRMR	RMSEA
Good fit		<3.00	>.90	>.90	>.90	>.90	≈.90	>.80	<.10	<.80
Model	1774.03 (1011)	1.76	.87	.94	.93	.94	.83	.80	.05	.45

4.5.3 Second order factor analysis

4.5.3.1 Exploratory factor analysis (EFA)

A second-order factors Maximal likelihood(ML) analysis, with Promax rotation, was computed on the 38 primary measurement items which related to individual benefits, social benefits, individual risks, and social risks. The items that were not related to these four factors were excluded. The appropriateness of data was performed prior to EFA for secondary factor analysis to indicate that the variables relate to one another enough to run a meaningful EFA (Gaskin2012a). The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.899, indicated meritorious (Gaskin 2012a) and Bartlett's Test of Sphericity is significant (p<0.001), indicated the relation of the variable (Gaskin 2012a). The results of factor loadings (correlations) for second order factors and their Cronbach alpha scores were provided on table 4.7. The results on table 4.7 indicated all items

loaded strongly according to their constructs (i.e. CD, SU, and EB loaded highly on IB). Thus, the results met the requirement for convergent and discriminant validity. The criteria for convergent validity was met because all factors loaded highly on their constructs (Table 4.7) and each item loaded significantly ($p<0.01$) on its own construct, and had higher correlation on its own than others (Loch et al 2003). The significance of each item to its own construct was confirmed by the correlation analysis. Also, the average variance extracted (AVE) for each construct that exceeded 0.5 (Table 4.9) confirmed convergent validity. The criteria for discriminant validity of second order factor was met because all factors load higher on their own constructs (Table 4.7), load significantly higher on their own constructs, correlation factor between constructs in factor correlation matrix did not exceed 0.7 (Table 4.8), and the square root of the AVE for each construct was larger than the inter-construct correlation (Table 4.9). For the internal consistency, the results of Cronbach alpha score are provided in Table 4.7, and the results of CR for each item are provided in Table 4.9.

Table 4.7: Results of Exploratory Factor Analysis (Loadings and Cross loadings), and Cronbach Alpha scores for Second Order Factors

| | Component | | | |
	IB	SB	SR	IR
Chronbach	**.93**	**.89**	**.89**	**.77**
CD1	**.65**	-.31	.19	.17
CD2	**.63**	-.19	.26	.08
CD3	**.69**	-.20	.32	.15
CD4	**.61**	-.11	.33	.13
CD5	**.74**	-.21	.26	.10
CD6	**.63**	-.27	.32	.02
CD7	**.68**	-.24	.20	.07
SU1	**.61**	.08	.08	.12

SU2	**.64**	-.02	.05	.11
SU3	**.67**	.02	.09	.16
EB1	**.72**	-.07	.02	.17
EB2	**.70**	-.05	.01	.05
EB3	**.64**	-.17	.15	.11
EB4	**.71**	-.13	.06	-.04
EB5	**.71**	-.10	.09	-.05
PF3	.24	**.43**	-.50	-.21
PF4	.28	**.49**	-.51	-.23
PF5	.30	**.42**	-.30	-.27
PF6	.28	**.45**	-.53	-.30
AT1	-.01	**.61**	-.22	-.04
AT2	.11	**.60**	-.20	-.15
RE1	.05	**.69**	-.33	-.23
RE2	.11	**.69**	-.30	-.29
RE3	.12	**.70**	-.29	-.30
RE4	-.03	**.62**	-.00	-.15
SP1	.08	.15	**.62**	.13
SP2	-.01	.21	**.65**	.10
SC1	.10	.32	**.70**	-.09
SC2	.05	.29	**.72**	-.12
SC3	.04	.37	**.73**	-.10
SC4	.06	.29	**.77**	-.16
SO1	.21	.40	**.56**	-.14
SO2	.14	.36	**.64**	-.23
IP1	.02	.40	-.29	**.60**
IP2	.07	.40	-.34	**.63**
IP3	.08	.39	-.40	**.57**
HP1	.07	.36	-.22	**.50**
HP2	.20	.26	-.12	**.45**

Table 4.8: Factor Correlation Matrix of Second Order Factors

Factors	IB	SB	SR	IR
IB	1.00	.54	-.02	-.07
SB	.54	1.00	.15	.14
SR	-.02	.15	1.00	.24
IR	-.07	.14	.24	1.00

Note IB=Individual Benefits, SB= Social Benefits, SR= Social Risks, IR= Individual Risks

Table 4.9: Result of Means, SDs, Reliabilities and Correlations of Second Order Factors

	#of items	mean	SD	CR	AVE	Range of Factor Loadings	IR	NH	SI	EU	INT	IB	SB	SR
IR	5	5.06	1.55	.76	.64	.53-.97	**.80**							
NH	4	3.84	1.53	.90	.70	.66-.90	-.06	**.83**						
SI	3	2.84	1.69	.91	.78	.84-.91	-.06	.35	**.88**					
EU	2	4.69	1.73	.81	.69	.67-.96	.03	.18	.32	**.83**				
INT	2	2.84	1.63	.92	.85	.89-.96	-.10	.39	.80	.32	**.92**			
IB	15	3.11	1.61	.86	.68	.70-.92	.07	.47	.70	.40	.70	**.82**		
SB	10	4.15	1.40	.86	.67	.65-.94	.20	.37	.49	.25	.46	.72	**.82**	
SR	8	4.35	1.43	.82	.61	.64-.92	.43	-.05	-.07	-.04	-.12	.00	.11	**.78**

Bold scores = the square root of AVE

4.5.3.2 Confirmatory factor analysis of second order factors

Confirmatory factor analysis (CFA) was performed using AMOS 21 to check on the construct, and identify the model fitness of second order factors. The Maximum Likelihood (ML) estimation method was employed. The overall fit indices suggest a good fit of the model to the data; most of the indices were greater than the recommended cut-off scores (see Table 4.10).

Table 4.10: Confirmatory Factor Analysis and Fit Indices of Second Order Factors

	χ^2(DF)	χ^2/DF	NFI	IFI	TLI	CFI	GFI	AGFI	SRMR	RMSEA
Good fit		<3.00	>.90	>.90	>.90	>.90	≈.90	>.80	<.10	<.80
Model	1922.63 (1075)	1.85	.85	.92	.92	.92	.81	.80	.06	.48

4.5.4 Common Method Bias (CMB)

The CMB was performed with two tests. 1) The Harman's single-factor test was conducted to see if the majority of the variance can be explained by a single factor (Podsakoff el al 2003). The test was conducted using unrotated principal components factor analysis with 49 extracted measures from EFA. The results showed that there was no single factor emerged from the unrotated solution, indicating CMB is not the issue. 2) Common latent factor (CLF) was conducted to capture the common variance among all observed variables in the model (Gaskin2012b). CLF was performed using AMOS. To do this, we applied CLF in our CFA model and compared the standardized regression weights of this model to the standardized regression weights of a model without CLF. The results showed that there was no larger differences (the difference greater than 0.2) (Gaskin2012b) found in our measures; indicating there was no CMB.

4.5.5 Invariance Test

An invariance test was performed to indicate that the same construct is being measured across some specified groups like age, gender, among others (Gaskin2012c). To do this, we created the variable called Net_exp. Net_exp was calculated by summing Nethomeyr (the number of years that a participant has internet connection at home), smartphoneyr (the number of years that a participant has used smartphone), tabletyr (the number of years that a participant has used tablet), Netperday (the number of hours per day that a participant uses the internet), socialnetworkhr (the number of hours per day that a participants uses social networks). Then we used the median of Net_exp to separate the Net_exp into two groups called hi_exp and lo_exp. We then compared the unstandardized regression weight differences of the measure items of these two groups from the CFA model. If the significant differences of the items between these two groups occur, the meaningful interpretation of measurement data is precluded. The results showed that there were no significant differences of measure items of these two groups (hi_exp and lo_exp), indicating that the factor structure and loadings are sufficiently equivalent across groups. Thus the factor structure and loadings are sufficiently equivalent across groups.

4.5.6 Structural Model Equation (SEM)

Prior to testing our SEM model, we performed three multivariate assumptions including linearity test, homoscedasticity, and multicollinearity test. 1) linearity test(Gaskin2012d) was done in order to confirm that the model is sufficient (the path is significant in linear model) to be tested by using on SEM (AMOS) since AMOS fits only

linear equation model (Gaskin2012d). To do this (Gaskin2012d), we did curve

estimations for second order factors model since we will use this in model for hypotheses

testing in our study. The results showed that all paths were significant when applying

linear model. 2) Homosceduasticity was done to confirm that the consistent variance

across different levels of the variable is existed because serious violations in

homoscedasticity (assuming a distribution of data is homoscedastic when in actuality it is

heteroscedastic) may result in overestimating the goodness of fit as measured by the

Pearson coefficient (Hair et al. 2010). To do this (Gaskin2012f), we applied linear

regression to our paths and plotted each relationship between regression standardized

residual of dependent variable and regression standardized predicted value of

independent variable. We found that all paths had consistent relationships. These mean

that the homoscedasticity for all paths were met (Hair et al 2010), and 3) multicollinearity

test was done to examine whether the independent variables are too highly correlated

with each other since the high correlation can make the construct less stable (Hair et al

2010). Following Gaskin(2012f), the way to check multicollinearity is to calculate

variance inflation factors (VIF). To do this, we ran a regression models with one

independent item serving as the dependent variable and the other items designated as

independent variables and then regressing it on all the remaining independent variables.

All the VIFs in each regression model were less than 10, which were below the usual

cutoff level of 10 (Hair et al 2010). Hence, multicollinearity problem was not found.

Hypotheses were tested by examining the SEM. The test includes estimating the

path coefficients, which indicate the strength of the relationships between the

independent and dependent variables and the R^2 value (the variance explained by the

independent variables) (Hair et al 2010). Results of the analysis including standardized

path coefficients, significances, and the amount of variance explained (R^2 value) for each

dependent variable is shown on Figure 4.2. Also the model fit values of this model are

shown under Figure 4.2.
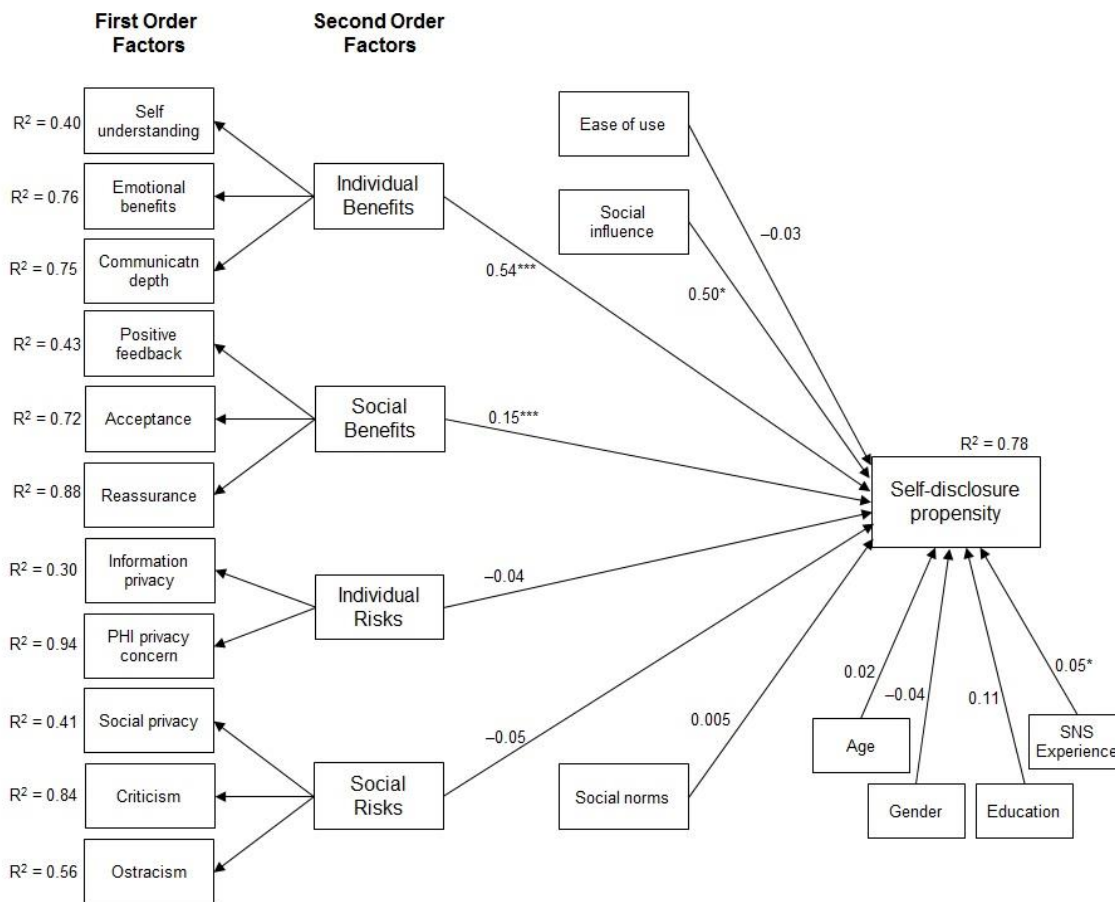
Model fit

	χ^2(DF)	χ^2/DF	NFI	IFI	TLI	CFI	GFI	AGFI	SRMR	RMSEA
Model	97.44(32)	3.05	.95	.97	.93	.97	.96	.90	.07	.07

Figure 4.2: Results of SEM Analysis

The results for primary order factor showed that CD and EB had the highest load

on IB, RE had the highest load on SB, HP had the highest load on IR, and SC had the

highest load on SR. The R^2 for the first order factors, and the standard regression weights

of the first order factors are provided on Figure 4.2. The results for secondary order factors from SEM model analysis showed that the combination of individual and social benefits, individual and social risks, ease of use of social network sites, social influence of social network sites use, nature of health problems, and control variables explained 78% of INT variance. Consistent with Falk & Miller (1992), the R^2 values for all endogenous constructs exceed 10%, implying a satisfactory and significant model. Individual, and social benefits, each had positive, and significant effect on INT, which had P<0.001 each. Consistent with H1, and H2, individual, and social benefits acquired by social media users have positive effect on personal health problems disclosure. Thus, H1, and H2 hypotheses are significantly supported. Individual, and social risks, each had negative effect on INT. However, they were not significant. Consistent with H3, and H4, individual, and social risks acquired by social media users had negative effect on personal information disclosure. Thus, H3, and H4 are supported. Contrasting to expectation, ease of use of social media did not have positive effect on INT. Thus hypothesis 5 is not supported. Social influence had significant positive effect on INT. Thus hypothesis 6 is significantly supported. As expected, nature of health problems had positive effect on INT. Thus hypothesis 7 is supported. For the control variables, social network experience had significant positive effect on INT at P <0.05. Sex had negative effect on INT, which means females had concern about personal health problems disclosure in social networks more than males. The summary of hypotheses testing was provided on table 4.11. For the model fit indices, all values in model fit table indicated good fit.

Table 4.11: Summary of Hypotheses Tests

Hyp. no.	Hypothesis (direction)	Path coefficient	Significance (2- tailed)	Supported?
H1	IB→ INT	.54	P<.001	Yes
H2	SB→INT	.16	P<.001	Yes
H3	IR→INT	-.04	NS	Yes but not sig
H4	SR→INT	-.03	NS	Yes but not sig
H5	EU →INT	-.03	NS	No, not sig
H6	SI → INT	.50	P<.001	Yes
H7	NH→INT	.01	NS	Yes but not sig
Controls	Age →INT	.02	NS	
	Sex →INT	-.04	NS	
	Education →INT	.01	NS	
	Socialnetwork_exp→INT	.05	P<.05	

4.5.7 Post Hoc Analysis

We did post-hoc power analysis with 95% confidential interval in order to check whether our sample size has strong statistical power to conclude our hypotheses. We got observed statistical power = 1.0(cut-off is 0.8). This means that our sample size has enough power.

4.6 DISCUSSION

The study showed that personal health information self-disclosure on social media was significantly influenced by several factors including individual benefits, social benefits, social influence, and social network experience. Benefits to self in terms of individual and social benefits, as hypothesized, are strongly supported at p<0.001. These suggest that individuals who find benefits including self-communication, self-understanding, emotional benefits, social acceptance, social reassurance, and positive

feedback on self-posting of personal health problems far outweigh risks of self-disclosure, and are more likely to reveal their personal health problems. For social influence, the positive significant effect of social influence on self-disclosure of personal health problems is consistent with Posey et al (2010), who reported that others who use social media can influence an individual's self-posting activities. Social network experience that had significant effect on self-disclosure of personal health problems, and is consistent with Bansal et al (2010), who found that social networking experiences influence individual's self-posting about personal health problems.

We did not find significant relationship between nature of health problems and personal health problems disclosure. However, a positive relationship of this path was found. This suggests that social media users, who are willing to accept and discuss chronic, stigmatized, and mental health problems posted by others, are likely to disclose their personal health problem in the same social media context. However, the nature of health problems in our study are examined in only two aspects – acceptance about self-posting of these health problems, and encouraging others to self-post on these health problems. These two aspects focus only on positive side. Thus users who tend to be positive for these two aspects for the three health conditions will be favorable towards disclosure their health problems in social networks. The other aspects that could cause negative effects such as social attention or social stigma that may lead to discouragement of self-posting, are not examined in this study. In order to see more effect of nature of health problems, further research is warranted.

We did not find a significant relationship between individual risks and social risks on self-disclosure of personal health problems. However, the negative relationship of these paths indicates that these two risk factors may heighten the fear of possible negative outcomes which lead to tendency against self-disclosure. The relatively low level of individual risks, and social risks concern reflects similar result reported by Spiekermann et al (2001) that privacy attitudes had little relationship to information disclosure. Another possible explanation might be majority of respondents (98.4%) use Facebook. In Facebook respondents may view or post about their health problems ranging from minor to major health problems on a daily basis. The more individuals see this type of post on social media, the more they are likely to view it as ordinary and mundane, and hence the less perceived are the risks regarding self-posting on personal health information. Thus, the risks seem not to be as much of an issue in revealing private information. This assumption was confirmed by a study by Gross & Acquisti (2005) on 4,000 Facebook users who concluded that the population of Facebook users is, by and large, quite oblivious, unconcerned, and pragmatic about their personal privacy. The study found that personal data is generously provided.

Contrary to expectation, ease of use of social media had negative effect on self-disclosure. The result might be explained that although the ease of use of social media may encourage individuals to use or post, it does not directly encourage people to disclose their health problems. Based on a previous study about technology acceptance model on mobile technology usage, it was found that ease of use also had a negative effect on intention to use (Nysveen et al 2005). The effect of ease of use on intention was seen when it was mediated by each of perceived usefulness, or attitude toward use. Thus

in our study, we might see the positive effect of ease of use regarding the theory if we include the attitude toward use as a mediating factor between ease of use, and self-disclosure intention.

For control variables, our study found that females were more concerned about self-disclosure on personal health information on social media more than males. The result was consistent with the study by Joinson et al (2008) that found that men tended to disclose sensitive issues including income, religion, and ethnicity more than women. Joinson et al (2008) further explained that women's lower levels of disclosure might be because women are more concerned with privacy issues more than men. However, this assumption was challenged by studies by Gross & Acquisti (2005), Valkenburg & Peter (2007), Huffaker & Calvert (2005) that found that there was no difference between males and females on personal information revelation on social network.

4.7 RESEARCH CONTRIBUTIONS

Our study expands the application of social exchange theory and social penetration theory in the context of self-disclosure of personal health problems in social media. To our knowledge, our study is the first study that examined social media users' attitude about health problems self-posting in a social media context. Recently, this type of posting is increasingly commonly observed. However, there is no study about social media users' attitude regarding this behavior. Previous studies (Bansal et al 2010, Wang & Midha 2012) related to health problems self-disclosure examined users' attitude on

self-disclosure on health social network. The results of the study provide useful insight to understand why users reveal their personal health problems in their social networks. Most importantly, the results showed that self benefits, including individual and social benefits, social influence, and social network using experience had strong influence on health problems self-disclosure. In addition individual risks and social risks had limited negative effect on self-disclosure on health problems. The reduced influence of risks to health problems self-disclosure might reflect that people nowadays are less concerned with or aware of the privacy issues as previous generations. Alternatively, attitudes about privacy have changed. Given that these factors explained 78% of variance on self-disclosure intention, the model is sufficient to adequately explain such behavior.

4.8   LIMITATIONS AND FUTURE RESEARCH

Although the results are useful in explaining the attitude of social media users on health problems self-disclosure, this study has limitations. The majority of the study participants was under 35, and most had a 4-year college education. This point must be taken into account in generalizing the results. The respondents were all living in the U.S., further limiting its generalizability to other settings. We grouped all primary factors together using EFA and used second ordered factors for SEM analysis. By using the second order factors, we may not be able to find how primary factors influence the self-disclosure intention. However, in order to find the primary effects' factors on self-discloser of personal health problems, we need to go back to our hypotheses, review, and re-write hypotheses and examine the new hypotheses. We also found that some

questionnaire items need to be revised in order to make it more effective for the future use. Although during EFA analysis we removed some items which have high cross loadings or low loading on their items, upon reviewing the questionnaire, we found that some of our items may need to be re-grouped. For example, the item about nature of health problems, we have 6 questions where three items ask whether some health problems should be encouraged to post, and the rest items ask whether some health problems post are acceptable. Based on EFA findings, these questions should be separated into two groups, one which deals with asking about acceptability, and the second that asks about encouragement.

We found that risks were a less significant influence on health problems self-disclosure intention. Further research is important in order to explain, or confirm this result. The point that we are interested in is the attitude change about health information privacy regarding different generations. Contrary to the expectation, we found that ease of use of social media had negative effect on health problems self-disclosure. We found that this result was reported on a previous study by Nysveen et al (2005) that ease of use had a negative direct effect on intention to accept the mobile chat use. However, in that study, they had not only the hypothesis that examined that ease of use had a direct effect on intention to accept the mobile chat, but they had others hypotheses that the ease of use was mediated by each of perceived usefulness, or attitude toward use. Nysveen et al (2005) reported that the significant effect on ease of use to intention to accept the mobile chat showed a significant effect when the ease of use was mediated via each of these two factors. Thus in a future research, the effect of ease of use on self-disclosure on health

problems may stronger if we apply attitude toward use as a mediator in the path between ease of use, and self-disclosure intention.

4.9 CONCLUSIONS

Based on social exchange theory and social penetration theory, this study develops a research model to examine why social media users disclose their personal health problems in their social networks. The empirical results support most of the hypothesized relationships that individual and social benefits, social influence, and social network experience had positive effect on self-disclosure of personal health problems where individual and social risks minimize social media users' intention to disclose their personal health information. However, this is a limited study that the majority samples of this study were university students who were studying in the US, which may affect the generalizability to other social media users, and in a global context. Nevertheless, it provides an effective basis for further research into self-disclosure of medical information in a social network context.

CHAPTER 5

CONCLUSIONS

Inappropriate disclosure of medical data is a major concern in the healthcare sector. With increased adoption of EHRs in healthcare organizations, coupled with the higher use of handheld devices and increased prevalence of "bring your own device" programs, the concern for security of medical data becomes heightened. This dissertation attempts to explore the attitudes of healthcare providers towards medical data misuse in the form of information access and disclosure. Disclosure of medical data may also occur by the patient when discussing their health conditions in a social network setting. Social media users post their personal health problems in their social media accounts, sharing with their friends, families, followers, and the public. In order to obtain a more complete picture of medical data disclosure, this dissertation also explored the attitude of health consumers towards self-disclosure of their personal health problems in their social network contexts.

The first essay addressed the healthcare providers' propensity to misuse medical data using deterrence theory as the basic research framework. Deterrence theory focuses on the use of sanctions to reduce misuse behaviors. In order to reduce misuse behaviors, healthcare providers must acknowledge the existence of a deterrent when they commit misuse behaviors. The second essay studied whether cultural values influence healthcare providers' misuse behaviors. In this study, Hofstede's national values and espoused cultural values were applied to test whether cultural values affect healthcare providers' misuse attitude at the cultural level and the individual level. In addition, moral belief and

social norms were also used to examine misuse attitudes. The third essay investigated social media users' attitude about revealing their personal health problems in their social network accounts. Social exchange theory and social penetration theory formed the two major theories that we based our hypotheses on. In addition to individual and social benefits and risks, the study employed, ease of use of social media, social influence, and nature of health problems as antecedents to determine self-disclosure intention of personal health problems in social media settings. Together, these essays provided a more complete and clear picture of disclosure of medical data.

In Essay 1 (Chapter 2), we applied perceived certainty and severity of sanctions as mediators in the model. These two constructs mediated the relationship between procedural and technical countermeasures, and medical data misuse propensity. The first essay extends the application of general deterrence theory in a healthcare context. The results showed that perceived severity of sanctions has a stronger effect in reducing medical data misuse than perceived certainty of sanctions. This finding is supported by studies that applied the deterrence in financial organizations (D'Arcy et al 2009, Hovav & D'Arcy 2012). However, the finding contradicts the previous studies (Peternoster 1987, Herath & Roa 2009) that applied deterrence in criminology. Therefore, further studies are needed before concluding that deterrence, applied in a healthcare setting is different from deterrence applied in a criminology study. Procedural countermeasures and technical countermeasures, each shows a different effect on deterrence. Procedural countermeasures have an impact on perceived severity of sanctions where technical countermeasures have an impact on perceived certainty of sanctions. In addition, the indirect effect of sanctions on medical data misuse was also found when combining these

two countermeasures together. Therefore, emphasizing these two countermeasures in holistic security programs will result in reducing medical data misuse in healthcare organizations as they affect healthcare provider's perception on severity and certainty of sanctions.

In Essay 2 (Chapter 3), we found support for cultural values moderating the relationship between deterrence, social norms, and moral belief and medical data misuse constructs. Our findings are strengthened by differences across different cultural values that the individual espouses and the variation of cultural values at cultural level of Thai and American healthcare providers. Essay 2 supports the espoused cultural values that individuals espouse different cultural values show different attitude on medical data misuse propensity. Also, it supports that the different cultural values at the national level of the Thais and Americans have different effects on medical data misuse propensity. However, there are findings in our study that contradict the previous assumptions (Hofstede 1990, Hwang et al 2003, Kim & Nam 1998, Roongrerngsuke 2010). Previous studies have indicated that procedural countermeasures had a stronger effect on perceived certainty and severity of sanction for Asians than Americans, whereas technical countermeasure had a stronger effect on perceived certainty and severity of sanctions for Americans than Asians (Hwang et al 2003, Hovav & D'Arcy 2012). Our study found technical countermeasures had a stronger effect on certainty and severity perception for both Thai and the US than procedural countermeasures whereas procedural countermeasures had an uncertain effect on sanctions perception for both cultures. For moral belief, prior research has reported that Asians have higher morality than Americans (Fan 1995). We found that Americans had higher morality than Thais healthcare

providers. These contrary findings might have been caused by the influence of a large number of medical students from Thailand in the research sample. One possible explanation is that these generation Y medical students are susceptible to Western influences, and that their thoughts and attitudes had become more westernized. This might explain why our findings of the two cultures were similar and why they are contrary to previous studies that were conducted with people from older generations. In espoused cultural theory, it is theorized that individuals from the same culture behave differently depending on the cultural values that they espouse. Our findings support this, in that individuals who espoused different cultural values had different perceptions on medical data misuse. We also found other cultural effects that contradict previous assumptions. The assumptions regarding individualism are contrary to previous study. Prior research has suggested that people with low IDV are likely to sit back and keep quiet about their faults or other faults and they need certainty of sanctions to offset any propensity to engage in misconduct (Salt et al 2011). We found that low individualism values did not strengthen the relationship between perceived certainty of sanctions and propensity to misuse medical data. Likewise, high individualism values did not strengthen the relationship between perceived severity of sanctions and propensity to misuse medical data.

Based on the findings in Essay1 and Essay 2, we found that the estimated coefficients of the two paths between perceived certainty of sanctions and propensity to misuse medical data, and perceived severity of sanctions and propensity to misuse medical data were low and insignificant. Procedural countermeasures and technical countermeasures failed to show strong significant effect on perceived certainty and

perceived severity of sanctions as they were shown in previous studies in financial organizations (D'Arcy et al 2009, Hovav & D'Arcy 2012). The low diminished effects might have arisen from the scenarios used in the study. Although the scenarios included major misuse behaviors viz; using other's accounts to access patient's medical data in a workplace, downloading patient's medical data in a personal device, accidentally accessing a patient's medical data, and sharing a patient's medical data in an online community, healthcare providers seem to overlook these situations and do not consider these situations as misuse. Also, in real life, these behaviors are rarely reported. This is to some extent worrisome because these behaviors constitute medical information breaches.

Furthermore the availability, functionality, and quality of handheld devices have led to a number of healthcare providers using them on a daily basis. We found in our survey that almost 90% of healthcare providers own a smartphone and almost 50% own a tablet. This finding was consistent with Manhattan Research (2012) that found that more than eight in ten physicians in the United States owned a smartphone and 62% owned a tablet. The study also found that of those healthcare providers who owned these devices, half of them used the devices at the point of care. Another report by Dell Secure Works (2014) said more than 2 out of 5 physicians have already used a smartphone or tablet during patient consultations. Thus, the unconcerned attitude about medical data misuse coupled with the higher rate of handheld devices adoption by healthcare providers generates greater opportunity for breach of health information security. A more careful and comprehensive security management that emphasizes common misuse behaviors and security countermeasures needs to be emphasized and paid more attention by executives and policy makers in order to reduce the breaches that are caused by the insiders.

The low coefficients may also be reflective of the real situation concerning information security issues among healthcare providers. In general, when people are requested to complete an online survey, they might choose to say positive things and conceal their faults in order to protect their image and reputation within their organizations. Since we used indirect questions through the scenarios in a survey, collected responses anonymously, and did not do the survey in lieu of their organizations, participants felt more comfortable answering the survey. We also found on the comments received in the survey that according to their genuine answers "the survey is so real than people may think that these situations are considered misuse situations", "I think for the sake of team, using other's accounts to access to patients' records should be fine", and "The survey is thought provoking and it might help me to be more concerned about these behaviors". If this is the case, then healthcare executives and policy makers need to take action to clear up attitude and behaviors regarding common misuse of medical data.

Insiders' behaviors that lead to information breach are a universal problem. In Essay 2, the results of the study showed that Thai and American healthcare providers had low perception of punishments on common medical data misuse behaviors. This may indicate that rigorous regulations and training are not taken into account by healthcare providers, as most of the institutions claim their healthcare providers do. We found that countermeasures do not have strong effect on healthcare providers' perceptions of severity and certainty of sanctions and only sanctions perception did not have enough effect to change healthcare providers misuse propensity.

In Essay 3 (Chapter 4), we explored the attitude of health consumers on the propensity to self-disclose personal health problems in their social media networks. We

employed social media subjects because it is becoming increasingly common to see people reveal their health problems in a social network setting. In this study, we applied social exchange theory and social penetration theory, which address individual and social benefits and risks of self-disclosure. Also, we integrated ease of use of social media, social influence, and nature of health problems as antecedents that determine personal health problems self-disclosure propensity in social media accounts. The results showed that individual and social benefits of health problems self-disclosure outweighed the risks of self-disclosure. The individual risks and social risks failed to have a significant negative effect on self-posting about health problems. This study highlighted the fact that attitudes of individuals about self-disclosure on personal health information have changed. People were less concerned and less aware of the risks of personal and social privacy on disclosure of personal health problems. However, this assumption has limited generalizability since the majority of participants in our study were less than 35 years old. The result may only reflect the attitude of younger generation about information privacy on health problem self-disclosure. Our study extends application of social exchange theory and social penetration theory to examine health consumers' attitude on personal health problem disclosure in social media settings. It is the first time that these theories are applied in self-revealing health problems in social media context. Further studies are needed to confirm the attitude change in different settings and with a different population.

The dissertation contributes to the scholarly discourse surrounding the attitude associated with the disclosure of medical data. Each essay seeks to clarify and understand a different aspect of propensity to disclose medical data from different theoretical perspectives. This strategy attempts at building a more complete picture of disclosure of

medical data from both the healthcare provider side; the national and international level, and the health consumer side than one particular study and theoretic examination would provide. We believe that our study reflects the current problems and real situations and will benefit healthcare executives, health policy makers and future researchers.

REFERENCES

1. Abril, P. S., & Cava, A. (2007). Health Privacy in a Techno-Social World: A Cyber-Patient's Bill of Rights. *Northwestern Journal of Technology and Intellectual Property*, *6*(3), 244-277.

2. af Wåhlberg, A. E. (2010). Re-education of young driving offenders; Effects on self-reports of driver behavior. *Journal of Safety Research*, *41*(4), 331-338.

3. AHIMA e-HIM Work Group on Maintaining the Legal EHR (2005). Update: Maintaining a Legally Sound Health Record—Paper and Electronic. *Journal of AHIMA* 76 (10), 64A–L.

4. Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions* Thousand Oaks, CA:SAGE Publications Inc..

5. Akerlof, George A. (1976). The Economics of Caste and of the Rat Race and Other Woeful Tales, *The Quarterly Journal of Economics*, 90(4): 599–617.

6. Albrecht, G. L., Walker, V. G., & Levy, J. A. (1982). Social distance from the stigmatized: A test of two theories. *Social Science & Medicine*, *16*(14), 1319-1327.

7. Altman, I., & Taylor, D. A. (1973). *Social penetration: The development of interpersonal relationships*. Oxford, UK: Holt, Rinehart & Winston.

8. Andrade, E. B., Kaltcheva, V., & Weitz, B. (2002). Self-disclosure on the web: the impact of privacy policy, reward, and company reputation. *Advances in Consumer Research*, *29*(1), 350-353.

9. Appari, A., & Johnson, M. E. (2010). Information security and privacy in healthcare: current state of research. *International Journal of Internet and Enterprise Management*, *6*(4), 279-314.

10. Appelbaum, R. P., Carr, D., Duneir, M., & Giddens, A. (2009). *Conformity, Deviance, and Crime. Introduction to Sociology*, New York, NY: W. W. Norton & Company, Inc.

11. Assembly of Behavioral and Social Sciences (US). Panel on Research on Deterrent and Incapacitative Effects, Blumstein, A., Cohen, J., & Nagin, D. (1978). *Deterrence and incapacitation: Estimating the effects of criminal sanctions on crime rates,* Washington, DC: National Academy of Sciences, 431.

12. Awad, N. F., & Krishnan, M. S. (2006). The personalization privacy paradox: an empirical evaluation of information transparency and the willingness to be profiled online for personalization. *MIS Quarterly*, *30*(1), 13-28.

13.   Bachman, R., Paternoster, R., & Ward, S. (1992). The rationality of sexual offending: Testing a deterrence/rational choice conception of sexual assault. *Law and Society Review*, *26*(2), 343-372.

14.   Bandura, A. (1963). *Social learning and personality development*. New York: Holt, Rinehart, and Winston.

15.   Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist*, *44*(9), 1175-1184.

16.   Bansal, G., Zahedi, F., & Gefen, D. (2010). The impact of personal dispositions on information sensitivity, privacy concern and trust in disclosing health information online. *Decision Support Systems*, *49*(2), 138-150.

17.   Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173-1182.

18.   Bateman, P. J., Pike, J. C., & Butler, B. S. (2011). To disclose or not: Publicness in social networking sites. *Information Technology & People*, *24*(1), 78-100.

19.   Beccaria, C. (1963). *On crimes and punishments* (introduction by H. Paolucci, Trans.). New York: Macmillan. (Original work published 1764)

20.   Bedau, H. A. (1983). Bentham's Utilitarian Critique of the Death penalty. *Journal of Criminal Law and Criminology*, 74(3), 1033-1065.

21.   Bedford, O., & Hwang, K. K. (2003). Guilt and Shame in Chinese Culture: A Cross-cultural Framework from the Perspective of Morality and Identity. *Journal for the Theory of Social Behaviour*, *33*(2), 127-144.

22.   Bentham, J. (1948). *An introduction to the principles of morals and legislation* (with an introduction by W. Harrison, Ed.). New York: Macmillan.

23.   Bersoff, D. M., & Miller, J. G. (1993). Culture, context, and the development of moral accountability judgments. *Developmental Psychology*, *29*(4), 664-676.

24.   Bronfenbrenner, U. (1970). *Two worlds of childhood*. New York: Russell Sage Foundation.

25.   Brown, J. D. (1996). *Testing in language programs.* Upper Saddle River, NJ: Prentice Hall Regents.

26.   Brown, P. & S. Levinson (1987), *Politeness: Some Universals in Language Use*, Cambridge, UK: Cambridge University Press

27. Campbell, S. *The privacy risks of sharing health info online*. Reputation.com, Web. 1 Jan. http://www.reputation.com/reputationwatch/articles/privacy-risks-sharing-health-info-online

28. Campbell, E.Q (1964). The internalization of moral norms. *Sociometry*, *27*(4), 391- 412.

29. Chan, M., Woon, I., & Kankanhalli, A. (2005). Perceptions of Information Security in the Workplace: Linking Information Security Climate to Compliant Behavior. *Journal of Information Privacy & Security*, *1*(3), 18-41.

30. Chang, S. E., & Lin, C. S. (2007). Exploring organizational culture for information security management. *Industrial Management & Data Systems*, *107*(3), 438-458.

31. Chapman, K. J., & Lupton, R. A. (2004). Academic dishonesty in a global educational market: a comparison of Hong Kong and American university business students. *International Journal of Educational Management*, *18*(7), 425-435.

32. Chellappa, R. K., & Sin, R. G. (2005). Personalization versus privacy: An empirical examination of the online consumer's dilemma. *Information Technology and Management*, *6*(2-3), 181-202.

33. Chen, B., & Bryer, T. (2012). Investigating instructional strategies for using social media in formal and informal learning. *The International Review of Research in Open and Distance Learning*, *13*(1), 87-104.

34. Chen, F. F., Sousa, K. H., & West, S. G. (2005). Teacher's corner: Testing measurement invariance of second-order factor models. *Structural Equation Modeling*, *12*(3), 471-492.

35. Chiu, C. M., Hsu, M. H., & Wang, E. T. (2006). Understanding knowledge sharing in virtual communities: an integration of social capital and social cognitive theories. *Decision Support Systems*, *42*(3), 1872-1888.

36. Choe, J. M. (2004). The consideration of cultural differences in the design of information systems. *Information & Management*, *41*(5), 669-684.

37. Cialdini, R. B. (2009). *Influence: Science and practice*. Boston, MA: Pearson education.

38. Cocroft, B. A. K., & Ting-Toomey, S. (1994). Facework in Japan and the United States. *International Journal of Intercultural Relations*, *18*(4), 469-506.

39. Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). *Applied multiple regression/correlation analysis for the behavioral sciences*. London, UK: Routledge.

40. Coleman, J. (1990). *Foundations of Social Theory*, Cambridge, MA: Belknap

41. Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*(3), 297-334.

42. Cudeck, R., & O'Dell, L. L. (1994). Applications of standard error estimates in unrestricted factor analysis: Significance tests for factor loadings and correlations. *Psychological Bulletin*, *115*(3), 475.

43. Curran, P. J., West, S. G., & Finch, J. F. (1996). The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychological Methods*, *1*(1), 16.

44. D'Arcy, J., & Herath, T. (2011). A review and analysis of deterrence theory in the IS security literature: making sense of the disparate findings. *European Journal of Information Systems*, *20*(6), 643-658.

45. D'Arcy, J., Hovav, A., & Galletta, D. (2009). User awareness of security countermeasures and its impact on information systems misuse: a deterrence approach. *Information Systems Research*, *20*(1), 79-98.

46. Dawson, J. F. (2014). Moderation in management research: What, why, when and how. *Journal of Business and Psychology, 29,* 1-19.

47. Dell Secure Works (2014). Making Mobility Matter in Healthcare Security. *Retrieved, from*http://f6ce14d4647f05e937f4-4d6abce208e5e17c2085b466b98c2083.r3.cf1.rackcdn.com/making-mobility-matter-in-healthcare-data-security-pdf-w-685.pdf

48. Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influences upon individual judgment. *The Journal of Abnormal and Social Psychology*, *51*(3), 629-636.

49. Dinev, T., & Hart, P. (2006). An extended privacy calculus model for e-commerce transactions. *Information Systems Research*, *17*(1), 61-80.

50. Dubin, J. A., Graetz, M. J., & Wilde, L. L. (1990). The effect of audit rates on the federal individual income tax, 1977-1986. *National Tax Journal*, *43*(4), 395-409.

51. Durkheim, E. (1950). *The Rules of Sociological Method*, Glencoe, IL: The Free Press.

52. Dutton,W. H., Blank, G., & Groselj, D. (2013). *Oxford Internet Survey 2007 Report: The Internet in Britain*. Oxford, UK: Oxford Internet Institute, University of Oxford.

53.	Dwyer, C., Hiltz, S., & Passerini, K. (2007). Trust and privacy concern within social networking sites: A comparison of Facebook and MySpace. *Proceeding of the Thirteenth Americas Conference on Information Systems (AMCIS 2007), Keystone CO*, 339-352.

54.	Edelmann, R. J. (1985). Social embarrassment: An analysis of the process. *Journal of Social and Personal Relationships*, *2*(2), 195-213.

55.	Eid, M., Lischetzke, T., Nussbeck, F. W., & Trierweiler, L. I. (2003). Separating trait effects from trait-specific method effects in multitrait-multimethod models: A multiple-indicator CT-C(*M*-1) model. *Psychological Methods*, *8*(1), 38-60.

56.	Eisenberg, N. (2000). Emotion, regulation, and moral development. *Annual Review of Psychology*, *51*(1), 665-697.

57.	Electronic Transaction Act, B.E. 2544(A.D. 2001). *Retrieved, from*http://www.bot.or.th/English/PaymentSystems/BOT_ps/PSRegulation/Documents/et_act_2544_Eng.pdf

58.	Electronic Transaction Act,(Number 2), B.E. 2551 (A.D. 2008). *Retrieved, from*http://www.thailaws.com/law/thaiacts/code1659.pdf

59.	Englehart, N. A. (2000). Rights and culture in the Asian values argument: the rise and fall of Confucian ethics in Singapore. *Human Rights Quarterly*, *22*(2), 548-568.

60.	Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, *4*(3), 272.

61.	Falk, R. F., & Miller, N. B. (1992). *A primer for soft modeling*. Akron, OH: University of Akron Press.

62.	Fan, X. (1995). The Chinese cultural system: Implications for cross-cultural management. *SAM Advanced Management Journal*, *60*(1), 14-20.

63.	Ferguson, T. J., & Stegge, H. (1998). *Measuring guilt in children: A rose by any other name still has thorns*. San Diego, CA, US: Academic Press, 19-74.

64.	Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, *7*(2), 117-140.

65.	Fisse, B., & Braithwaite, J. (1986). The Allocation of Responsibility for Corporate Crime: Individualism, Collectivism and Accountability, *Sydney Law Review*, *11*(1), 468-513

66.	Ford, D. P., Connelly, C. E., & Meister, D. B. (2003). Information systems research and Hofstede's culture's consequences: an uneasy and incomplete

partnership. *IEEE Transactions on Engineering Management*, *50*(1), 8-25.

67. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research (JMR)*, *18*(1), 39-50.

68. Freeman, L. C. (1965). *Elementary applied statistics: for students in behavioral science*. Hoboken, NJ: John Wiley & Sons.

69. Garland, H., & Brown, B. R. (1972). Face-saving as affected by subjects' sex, audiences' sex and audience expertise. *Sociometry*, *35*(2), 280-289.

70. Gaskin, J., (2012a), "Exploratory Factor analysis", Gaskination's StatWiki. http://statwiki.kolobkreations.com/wiki/Exploratory_Factor_Analysis.

71. Gaskin, J., (2012b), "Confirmatory Factor analysis", Gaskination's StatWiki. http://statwiki.kolobkreations.com/wiki/Confirmatory_Factor_Analysis.

72. Gaskin, J., (2012c), "Measurement of model Invariance", Gaskination's StatWiki. http://statwiki.kolobkreations.com/wiki/Confirmatory_Factor_Analysis#Measurement_Model_Invariance.

73. Gaskin, J., (2012d), "Structural equation model", Gaskination's StatWiki. http://statwiki.kolobkreations.com/wiki/Structural_Equation_Modeling.

74. Gaskin, J., (2012e), "Mediation", Gaskination's StatWiki. http://statwiki.kolobkreations.com/wiki/Structural_Equation_Modeling#Mediation.

75. Gaskin, J., (2012f), "Multicollinearity", Gaskination's StatWiki. http://statwiki.kolobkreations.com/wiki/Data_screening#Multicollinearity.

76. Gaskin, J., (2012g), "Multigroup moderation", Gaskination's StatWiki. http://statwiki.kolobkreations.com/wiki/Structural_Equation_Modeling#Multi-group_effects.

77. Gaston, S. J. (1996). *Information security: strategies for successful management*. Ontario, Canada: Canadian Institute of Chartered Accountants.

78. Geertz, C. (1973). Thick Description: Toward an Interpretive Theory of Culture, in *The Interpretation of Cultures: Selected Essays*, New York: Basic Books.

79. Gefen, D., Straub, D. W., & Boudreau, M. C. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communication of AIS, 4*(1), 1-77.

80. George, D. (2006). *SPSS for Windows Step by Step: A Simple Study Guide and Reference, 17.0 Update, 10/e*. India: Pearson Education India.

81. Gibbs, J. L., Ellison, N. B., & Heino, R. D. (2006). Self-presentation in online personals the role of anticipated future interaction, self-disclosure, and perceived success in Internet dating. *Communication Research*, *33*(2), 152-177.

82. Goffman, E. (1955). On face-work: an analysis of ritual elements in social interaction. *Psychiatry: Journal for the Study of Interpersonal Processes*, *18*(1), 213–231.

83. Gray, B. T. (1997). Higher-Order Factor Analysis. Paper presented at the annual meeting of the southwest Education Research Association. Retrieved June, 2014, from http://files.eric.ed.gov/fulltext/ED407418.pdf.

84. Gross, R., & Acquisti, A. (2005, November). Information revelation and privacy in online social networks. In *Proceedings of the 2005 ACM workshop on Privacy in the electronic society* (WPES'05). New York, NY: ACM press.71-80.

85. Hair, J. F. Jr., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis (7th ed.)*. Upper Saddle River, NJ: Prentice Hall.

86. Hart, J., Ridley, C., Taher, F., Sas, C., & Dix, A. (2008, October). Exploring the facebook experience: a new approach to usability. In *Proceedings of the 5th Nordic conference on Human-computer interaction: building bridges* (NordiCHI '08). New York, NY: ACM press, 471-474.

87. Hwang, A., Francesco, A. M., & Kessler, E. (2003). The relationship between individualism-collectivism, face, and feedback and learning processes in Hong Kong, Singapore, and the United States. *Journal of Cross-Cultural Psychology*, *34*(1), 72-91.

88. Health Information Technology Resear (2011), Information Security Policy Template. *health.gov*. Web. 1 Jan. <http://www.healthit.gov/sites/default/files/tools/info_security_policy_template_v 1_0.docx>.

89. Herath, T., & Rao, H. R. (2009). Encouraging information security behaviors in organizations: Role of penalties, pressures and perceived effectiveness. *Decision Support Systems*, *47*(2), 154-165.

90. HIPPA (1996, 21 October) Retrieved April 30, 2013, from http://www.gpo.gov/fdsys/pkg/PLAW-104publ191/pdf/PLAW-104publ191.pdf

91. HIPPA Omnibus Rule (2013, January) Retrieved April 30, 2013, from http://www.hipaasurvivalguide.com/hipaa-omnibus-rule.php

92.   HITECH (2009) Retrieved April 30, 2013, from http://www.hipaasurvivalguide.com/hitech-act-summary.php

93.   Ho, D. Y. F. (1976).On the concept of face. *American Journal of Sociology*, *81*(4), 867–884.

94.   Hobbes,T. (1950). *Leviathan*. Reprint. New York: Duntton.

95.   Hofstede, G. (1984). *Culture's consequences: International differences in work-related values* (Vol. 5). Newbury Park, CA: Sage.

96.   Hofstede, G. (1994). *Values survey modules manual*. Tilburg, Netherlands, IRIC:Tilburg University.

97.   Hofstede, G. (1997). *Cultures and Organizations: Software of the mind*. New York: McGraw Hill.

98.   Hofstede, G. (2010). Geert hofstede. *National cultural dimensions*. *Retrieved, from* http://geert-hofstede.com/national-culture.html

99.   Hofstede, G. (Ed.). (1998). *Masculinity and femininity: The taboo dimension of national cultures* (Vol. 3). Thousand Oaks, CA: Sage.

100.   Hofstede, G., & Bond, M. H. (1988). The Confucius connection: From cultural roots to economic growth. *Organizational dynamics*, *16*(4), 5-21.

101.   Hofstede, G., Hofstede, G. J., & Minkov, M. (1991). *Cultures and organizations*. London, UK: McGraw-Hill.

102.   Hollenbaugh, E. E. (2010). Personal journal bloggers: Profiles of disclosiveness. *Computers in Human Behavior*, *26*(6), 1657-1666.

103.   Hollenbaugh, E. E., & Everett, M. K. (2013). The Effects of Anonymity on Self-Disclosure in Blogs: An Application of the Online Disinhibition Effect. *Journal of Computer-Mediated Communication*, *18*(3), 283-302.

104.   Hollinger, R. C. (1993). Crime by computer: Correlates of software piracy and unauthorized account access. *Security Journal*, *4*(1), 2-12.

105.   Hollinger, R. C., & Clark, J. P. (1983). Deterrence in the workplace: Perceived certainty, perceived severity, and employee theft. *Social Forces*, *62*(2), 398-418.

106.   Homans, G. C. (1958). Social behavior as exchange. *American Journal of Sociology*, *63*(6), 597-606.

107.   Hovav, A., & D'Arcy, J. (2012). Applying an extended model of deterrence across cultures: An investigation of information systems misuse in the US and South Korea. *Information & Management*, *49*(2), 99-110.

108. Hsiao, C. J., & Hing, E. (2012). *Use and Characteristics of Electronic Health Record Systems Among Office-based Physician Practices, United States, 2001-2012*. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics.

109. Huffaker, D. A., & Calvert, S. L. (2005). Gender, identity, and language use in teenage blogs. *Journal of Computer-Mediated Communication*, *10*(2), article 1.

110. Hwang, A., Francesco, A. M., & Kessler, E. (2003). The relationship between individualism-collectivism, face, and feedback and learning processes in Hong Kong, Singapore, and the United States. *Journal of Cross-Cultural Psychology*, *34*(1), 72-91.

111. Jermier, J. M., Slocum Jr, J. W., Fry, L. W., & Gaines, J. (1991). Organizational subcultures in a soft bureaucracy: Resistance behind the myth and facade of an official culture. *Organization Science*, *2*(2), 170-194.

112. Joinson, A. N., Paine, C., Buchanan, T., & Reips, U. D. (2008). Measuring self-disclosure online: Blurring and non-response to sensitive items in web-based surveys. *Computers in Human Behavior*, *24*(5), 2158-2171.

113. Joinson, A. N., Reips, U. D., Buchanan, T., & Schofield, C. B. P. (2010). Privacy, trust, and self-disclosure online. *Human–Computer Interaction*, *25*(1), 1-24.

114. Jourard, S. M. (1971). *Self-disclosure: An experimental analysis of the transparent self.* New York: Wiley.

115. Kam, L. E., & Chismar, W. G. (2003, January). A self-disclosure model for personal health information. Paper presented at the *36th Annual Hawaii International Conference on System Sciences*, Hawaii, 2003.

116. Khaled, R., Biddle, R., Noble, J., Barr, P., & Fischer, R. (2006, January). Persuasive interaction for collectivist cultures. In *Proceedings of the 7th Australasian User interface conference-Volume 50* (pp. 73-80). Australian Computer Society, Inc.

117. Kim, D. J. (2008). Self-perception-based versus transference-based trust determinants in computer-mediated transactions: a cross-cultural comparison study. *Journal of Management Information Systems*, *24*(4), 13-45.

118. Kim, J. Y., & Nam, S. H. (1998). The concept and dynamics of face: Implications for organizational behavior in Asia. *Organization Science*, *9*(4), 522-534.

119. Kinsey, K. A. (1992). *Deterrence and alienation effects of IRS enforcement: An analysis of survey data. J. Slemrod, ed. Why People Pay Taxes*. University of Michigan Press, Ann Arbor, 259–285.

120. Kleck, G. (1988). Crime control through the private use of armed force. *Soc. Probs.*, *35*(1), 1-21.

121. Kline, P. (2013). *Handbook of psychological testing*. London, UK: Routledge.

122. Knapp, M. L., & Vangelisti, A. L. (1992). *Interpersonal communication and human relationships*. Boston, MA: Allyn and Bacon.

123. Ko, H. C. (2013). The determinants of continuous use of social networking sites: An empirical study on Taiwanese journal-type bloggers' continuous self-disclosure behavior. *Electronic Commerce Research and Applications*, *12*(2), 103-111.

124. Kohlberg, L. & Turiel, E. (1971). *Moral development and moral education*. In G. Lesser, ed. Psychology and educational practice. Chicago, IL: Scott Foresman.

125. Laurenceau, J. P., Barrett, L. F., & Pietromonaco, P. R. (1998). Intimacy as an interpersonal process: the importance of self-disclosure, partner disclosure, and perceived partner responsiveness in interpersonal exchanges. *Journal of Personality and Social Psychology*, *74*(5), 1238-1251.

126. Leach, J. (2003). Improving user security behaviour. *Computers & Security*, *22*(8), 685-692.

127. Lee, J., & Lee, Y. (2002). A holistic model of computer abuse within organizations. *Information Management & Computer Security*, *10*(2), 57-63.

128. Leyva C. (2013). HIPAA Omnibus Rule summary.*Retrieved, from* http://www.hipaasurvivalguide.com/hipaa-omnibus-rule.php

129. Loch, K. D., Straub, D. W., & Kamel, S. (2003). Diffusing the internet in the Arab world: the role of social norms and technological culturation. *IEEE Transactions on Engineering Management*, *50*(1), 45-63.

130. Lu, H. P., & Hsiao, K. L. (2007). Understanding intention to continuously share information on weblogs. *Internet Research*, *17*(4), 345-361.

131. Luo, Y. (1997). Guanxi: principles, philosophies, and implications. *Human Systems Management*, *16*(1), 43-51.

132. Magnus, J. R., Polterovich, V. M., Danilov, D. L., & Savvateev, A. V. (2002). Tolerance of cheating: An analysis across countries. *The Journal of Economic Education*, *33*(2), 125-135.

133. Malhotra, N. K., Kim, S. S., & Agarwal, J. (2004). Internet users' information privacy concerns (IUIPC): the construct, the scale, and a causal model. *Information Systems Research*, *15*(4), 336-355.

134.   Manhattan Research (2012). Taking the Pulse. *Retrieved, from*
        http://www.manha-ttanresearch.com/products/Research_Modules/Physici-
        an/physicians-2012-mobile-social-media.aspx

135.   McDonell, J., Strom-Gottfried, K. J., Burton, D. L., & Yaffe, J. (2006).
        *Behaviorism, social learning, and exchange theory, in S. P. Robbins, P.
        Chatterjee, and E. R. Canda, Contemporary human behavior theory: a critical
        perspective for social work.* Upper Saddle River, NJ: Pearson, 349-85.

136.   Metzger, M. J. (2004). Privacy, trust, and disclosure: Exploring barriers to
        electronic commerce. *Journal of Computer-Mediated Communication*, *9*(4),
        article 1.

137.   Mickelson, K. D. (1997). Seeking social support: Parents in electronic support
        groups. *Culture of the Internet*. Mahwah, NJ: Lawrence Erlbaum, 157-178.

138.   Miura, A., & Yamashita, K. (2007). Psychological and social influences on blog
        writing: An online survey of blog authors in Japan. *Journal of Computer-
        Mediated Communication*, *12*(4), 1452-1471.

139.   Modigliani, A. (1968).Embarrassment and Embarrassibility. *Sociometry*, *31*(3),
        313–326.

140.   Monge, P. R., & Contractor, N. S. (2003). *Theories of communication networks*.
        New York, NY: Oxford University Press.

141.   Nagin, D. S. & Pogarsky, G. (2001). Integrating celerity, impulsivity, and
        extralegal sanction threats into a model of general deterrence and evidence.
        Criminology 39(4), 865–891.

142.   Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the
        organizational advantage. *Academy of Management Review*, *23*(2), 242-266.

143.   National Health Act, B.E. 2550 (A.D.2007). *Retrieved,
        from*http://www.thailawforum.com/laws/National%20Health%20Act_2007.pdf

144.   Newcomb, T.M. (1943). *Personality and Social Change: Attitude Formation in a
        Student Community*, New York: Dryden Press.

145.   Newsom, J. (2005). A quick primer on exploratory factor analysis. *Retrieved
        from:* www.upa.pdx.edu/IOA/Newsom/semcllass/ho_fa.doc

146.   Oz, E. (1994). *Ethics for an Information Age*. New York, NY: McGraw-Hill
        Higher Education.

147.   Pan, S. H. (2008). Forgiveness in individualism and collectivism. In *Theological
        Forum* (Vol. 52, pp. 107-124).

148.   Park, H., Rehg, M. T., & Lee, D. (2005). The influence of Confucian ethics and collectivism on whistleblowing intentions: A study of South Korean public employees. *Journal of Business Ethics*, *58*(4), 387-403.

149.   Parsons, T. (1951). *The Social System*, New York: Routledge.

150.   Paternoster, R. (1987). The deterrent effect of the perceived certainty and severity of punishment: A review of the evidence and issues. *Justice Quarterly*, *4*(2), 173-217.

151.   Pennebaker, J. W. (1997). Writing about emotional experiences as a therapeutic process. *Psychological Science*, *8*(3), 162-166.

152.   Pennebaker, J. W., & Graybeal, A. (2001). Patterns of natural language use: Disclosure, personality, and social integration. *Current Directions in Psychological Science*, *10*(3), 90-93.

153.   Perkins, H. (2002). Social norms and the prevention of alcohol misuse in collegiate contexts. *Journal of Studies on Alcohol and Drugs*, (Supplement No. 14), 164-172.

154.   Pew Research Center's Internet & American Life Project. Available at: http://pewinternet.org/Reports/2011/Social-Life-of-Health-Info.aspx

155.   Piaget, J. (1965). *The moral judgment of the child*. New York, NY: The Free.

156.   Piccoli, G., & Ives, B. (2003). Trust and the unintended effects of behavior control in virtual teams. *MIS Quarterly*, 27(3), 365-395.

157.   Platteau, J. P. (1994). Behind the market stage where real societies exist-part I: The role of public and private order institutions. *The Journal of Development Studies*, *30*(3), 533-577.

158.   Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879-903.

159.   Posey, C., Lowry, P. B., Roberts, T. L., & Ellis, T. S. (2010). Proposing the online community self-disclosure model: the case of working professionals in France and the UK who use online communities. *European Journal of Information Systems*, *19*(2), 181-195.

160.   Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, *36*(4), 717-73.

161.   Preston, D. S., Karahanna, E., & Rowe, F. (2006). Development of shared understanding between the chief information officer and top management team in

US and French organizations: A cross-cultural comparison. *IEEE Transactions on Engineering Management*, *53*(2), 191-206.

162. PrincewaterhouseCoopers Health Research Institute (PwC HRI). (April2012).Social Media "likes" Healthcare: From marketing to social business. *Retrieved, fromhttp://www.pwc.com/us/en/health-industries/publications/health-care-social-media.jhtml*

163. Quazi, M. M. (1993). Effective drug-free workplace plan uses worker testing as a deterrent. *Occupational Health Safety*, *62*(6), 26–31.

164. Raykov, T., & Widaman, K.F. (1995).Issues in structural equation modeling research, *Structural Equation Modeling: A Multidisciplinary Journal*, 2, 289-318.

165. Redspin. (2013)Breach Report 2013: Protected Health Information. *Retrieved, from*https://www.redspin.com/docs/Redspin-2013-Breach-Report-Protected-Health-Information-PHI.pdf

166. Reise, S. P., Widaman, K. F., & Pugh, R. H. (1993). Confirmatory factor analysis and item response theory: two approaches for exploring measurement invariance. *Psychological Bulletin*, *114*(3), 552-566.

167. Robinson, W. S. (2009). Ecological correlations and the behavior of individuals. *International Journal of Epidemiology*, *38*(2), 337-341.

168. Roloff, M. E. (1981) *Interpersonal communication: The social exchange approach*. Beverly Hills, CA: Sage Publications, Inc.

169. Roongrerngsuke, S. (2010). *Best HR practices in Thailand*. Thailand: Nations News Network Co.,Ltd.

170. Ruppert, M. P. (2004). Defining the Meaning of 'Auditing' and 'Monitoring' & Clarifying the Appropriate Use of the Terms. *AHIA - HCCA focus group. Retrieved, from https://www.ahia.org/assets/Uploads/pdfUpload/WhitePapers/DefiningAuditingAndMonitoring.pdf*

171. Salter, S. B., Guffey, D. M., & McMillan, J. J. (2001). Truth, consequences and culture: A comparative examination of cheating and attitudes about cheating among US and UK students. *Journal of Business Ethics*, *31*(1), 37-50.

172. Sartorius, N. (2007). Stigmatized illnesses and health care. *Croatian Medical Journal*, *48*(3), 396-397.

173. Schoenborn, C. A., & Heyman, K. M. (2009). Health characteristics of adults aged 55 years and over: United States, 2004–2007. *National Health Statistics Report*, *16*, 1-31.

174.   Seigel, J. L., Welsh C.B. (2005). *Juvenile Delinquency: The Core 5th Edition*. Belmont CA: Wadsworth, Cengage Learning.

175.   Shavell, S. (1992). A note on marginal deterrence. *International Review of Law and Economics*, *12*(3), 345-355.

176.   Shaw, J. B. (1990). A cognitive categorization model for the study of intercultural management. *Academy of Management Review*, *15*(4), 626-645.

177.   Silberman, M. (1976). Toward a theory of criminal deterrence. *American Sociological Review*, *41*(3), 442-461.

178.   Simoms, T. (2002). Behavioral integrity: The perceived alignment between managers' words and deeds as a research focus. *Organization Science*, *13*(1), 18-35.

179.   Skinner, B. F. (1963). *Science and human behavior*. New York: Appleton.

180.   Skinner, W. F., & Fream, A. M. (1997). A social learning theory analysis of computer crime among college students. *Journal of Research in Crime and Delinquency*, *34*(4), 495-518.

181.   Smith, H. J., Milberg, S. J., & Burke, S. J. (1996). Information privacy: measuring individuals' concerns about organizational practices. *MIS Quarterly*, *20*(2), 167-196.

182.   Solove, D. J. (2006). A taxonomy of privacy. *University of Pennsylvania Law Review*, *154*(3), 477-564.

183.   Spiekermann, S., Grossklags, J., & Berendt, B. (2001, October). E-privacy in 2nd generation E-commerce: privacy preferences versus actual behavior. In *Proceedings of the 3rd ACM conference on Electronic Commerce* (EC'01). New York, NY: ACM, 38-47.

184.   Srite, M., & Karahanna, E. (2006). The role of espoused national cultural values in technology acceptance. *MIS Quarterly*, *30*(3), 679-704.

185.   Srivastava, R. (2012). Effect of Cross Culture on Ethical Behavior of Y Generation-MBA Students-Is it Changing? A Three Nation Study (Emerging and Developed). *Research Journal of Business Management*, *6*(2), 52-60.

186.   Straub Jr, D. W., & Nance, W. D. (1990). Discovering and Disciplining Computer Abuse in Organizations: A Field Study. *MIS Quarterly*, *14*(1),45-62.

187.   Straub, D. W., & Welke, R. J. (1998). Coping with systems risk: security planning models for management decision making. *MIS Quarterly*, *22*(4), 441-469.

188. Straub, D., Boudreau, M. C., & Gefen, D. (2004). Validation Guidelinesfor IS Positivist Research. *Communications of the Association for Information Systems*, *13*(1), 390-427.

189. Straub, D., Loch, K., Evaristo, R., Karahanna, E., & Srite, M. (2002). Toward a theory-based measurement of culture. *Human factors in information systems*. Hershey PA: IRM Press. 61-82.

190. Summerfield M. (May 18, 2006). Evolution of Deterrence Crime theory.*Retrieved, from* http://www.associatedcontent.com/article/32600/evolution_of_deterrence_crime_t heory.html.

191. Tamir, D. I., & Mitchell, J. P. (2012). Disclosing information about the self is intrinsically rewarding. *Proceedings of the National Academy of Sciences*, *109*(21), 8038-8043.

192. Teng A. (April 26, 2013).Medical student who tweeted patient's info suspended from clinic postings. The Straits Times.

193. The Posttoday (Oct30, 2013). Social online blames nurses posting photo while working online. The Posttoday.

194. Tisnado, D. M., Adams, J. L., Liu, H., Damberg, C. L., Hu, F. A., Chen, W. P., ...& Kahn, K. L. (2006). Does the concordance between medical records and patient self-report vary with patient characteristics?*Health Services and Outcomes Research Methodology*, *6*(3-4), 157-175.

195. Title,C.R.(1980). *Sanctions and Social Deviance: The Question of Deterrence*. New York, NY: Praeger.

196. Tittle, C. R. (1969). Crime rates and legal sanctions. *Social Problems*, *16*(4), 409-423.

197. Tittle, C. R., & Rowe, A. R. (1974). Certainty of arrest and crime rates: A further test of the deterrence hypothesis. *Social Forces*, *52*(4), 455-462.

198. Torabi, S., & Beznosov, K. (2013). Privacy Aspects of Health Related Information Sharing in Online Social Networks}. In *Presented as part of the 2013 USENIX Workshop on Health Information Technologies}*. USENIX}.

199. Tosi, H. L., & Greckhamer, T. (2004). Culture and CEO compensation. *Organization Science*, *15*(6), 657-670.

200. Tufekci, Z. (2008). Can you see me now? Audience and disclosure regulation in online social network sites. *Bulletin of Science, Technology & Society*, *28*(1), 20-36.

201. Urbaczewski, A., & Jessup, L. M. (2002). Does electronic monitoring of employee internet usage work?.*Communications of the ACM*, *45*(1), 80-83.

202. USC Annenberg School of Communication-Center for the Digital Future, Surveying the digital future-year four, http://www.digitalcenter.org/downloads/DigitalFutureReport-Year4-2004.pdf

203. Valkenburg, P. M., & Peter, J. (2007). Preadolescents' and adolescents' online communication and their closeness to friends. *Developmental Psychology*, *43*(2), 267-277.

204. Velleghem, S. V., Thijs, D., and Ruyck, T. D. Social media around the world 2012, Available at www.slideshare.net/InSitesConsulting/social-media-aroundthe-world-2012-by-insites-consulting.

205. Wang, Y., & Midha, V. (2012). User Self-Disclosure on Health Social Networks: A Social Exchange Perspective. Paper presented at the 33rd International Conference on Information Systems, Orlando FL, 2012. *Retrieved, from*http://aisel.aisnet.org/cgi/viewcontent.cgi?article=1284&context=icis2012

206. Warkentin, M., Johnson, A.C. & Adams, A.C. (2006) 'User interaction with healthcareinformation systems: Do healthcare professionals want to comply with HIPAA?',*Proceedings of the 12th Americas Conference on Information Systems*, Acapulco, Mexico, pp.2682–2691.

207. Watcharasriroj, B., Kangsanan,K., & Chodchey, B. (2007).*Cultural Analysis of Thailand and Its Implications for Organizational Management*. Bangkok Thailand: NIDA.

208. Wenzel, M. (2004). The social side of sanctions: personal and social norms as moderators of deterrence. *Law and Human Behavior*, *28*(5), 547-567.

209. Wheeless, L. R., & Grotz, J. (1976). Conceptualization and measurement of reported self-disclosure. *Human Communication Research*, *2*(4), 338-346.

210. Whitman, M. E., Townsend, A. M., & Aalberts, R. J. (2001). *Information systems security and the need for policy*. Information Security Management: Global Challenges in the New Millennium. Ed. Gurpreet Dhillon. Hershey PA: IGI Global.

211. Whitty, M. T. (2008). Revealing the 'real'me, searching for the 'actual'you: Presentations of self on an internet dating site. *Computers in Human Behavior*, *24*(4), 1707-1723.

212. Wybo, M. D., & Straub Jr, D. W. (1989). Protecting organizational information resources. *Information Resources Management Journal (IRMJ)*, *2*(4), 1-16.

213. Yang, M. C. (1945), *A Chinese Village: Taitou, Shatung Province*, New York: Columbia University Press.

214. Yates, J. F., & Stone, E. R. (1992). *The risk construct*. Oxford, UK: John Wiley & Sons.

215. Yoo, B., Donthu, N., & Lenartowicz, T. (2011). Measuring Hofstede's five dimensions of cultural values at the individual level: Development and validation of CVSCALE. *Journal of International Consumer Marketing*, *23*(3-4), 193-210.

216. Zucker, L. G. (1977). The role of institutionalization in cultural persistence. *American Sociological Review*, *42*(5), 726-743.

APPENDICES

APPENDIX A: INSTRUMENTS

ESSAY 1: SCENARIOS AND INSTRUMENT

Scenario 1: Password Use

		Factor loading
Ann has just changed her password as required by current IT policy. She needed to look up a patient's lab results. Her password was rejected and after several attempts, her account was locked. She noted that her colleague had left her computer unattended and logged in, and that she could check the lab results on her colleague's account.		
INT1	If you were Ann, you would use your colleague's account to look up a patient's lab results.	.85
INT2	I could see myself using my colleague's account to look up a patient's lab results if I were in Ann's situation.	.85
PC1	Ann would probably be caught using her colleague's account to look up a patient's lab results.	.71
PC2	There is a high probability that Ann's institution would discover that Ann used her colleague's account to look up a patient's lab result.	.79
PS1	If caught using her colleague's account to look up a patient's lab results, Ann would be severely reprimanded.	.81
PS2	If caught using her colleague's account to look up a patient's lab results, Ann's punishment would be severe.	.79

Scenario 2: Download to personal device

		Factor loading
Pete was assigned to present a patient case. He found the process of assembling all the lab results from all admissions and outpatient visits to be tedious. He could compile this much quicker if he used an iPad to take pictures of the lab results screens. These images included the patient's name and the medical record number.		
INT1	If you were Pete, you would use your iPad to take pictures of the lab results screens.	.86
INT2	I could see myself using my iPad to take pictures of the lab results screens if I were in Pete's situation.	.90
PC1	Pete would probably be caught using his iPad to take pictures of the lab results screens.	.69
PC2	There is a high probability that Pete's institution would discover that he used his iPad to take pictures of the lab result screens.	.74
PS1	If caught using his iPad to take pictures of the lab results screens, Pete would be severely reprimanded.	.84
PS2	If caught using his iPad to take pictures of the lab results screens, Pete's punishment would be severe.	.82

Scenario 3: Unauthorized access

Kate was searching for a patient's health information in her organization's Electronic Health Records. When she typed in the patient's name, several similar names came up and she clicked on the one she thought was her patient. Instead, she found that it was the record of her supervisor, who had a similar name.		Factor loading
INT1	If you were Kate, you would look through the supervisor's record.	.81
INT2	I could see myself looking through the supervisor's record if I were in Kate's situation.	.74
PC1	Kate would probably be caught looking through the supervisor's record.	.79
PC2	There is a high probability that Kate's institution would discover that Kate looked through her supervisor's record.	.83
PS1	If caught looking through her supervisor's record, Kate would be severely reprimanded	.81
PS2	If caught looking through her supervisor's record, Kate's punishment would be severe.	.82

Scenario 4: Social Network Sharing

Paul has just accepted an invitation to join a closed group for health providers on a social network. He was told that he could share patients' history, x-rays, CT-scan, EKG, and labs reports of patients with the group if he needs help. The group includes medical students, interns, residents, and specialists. Paul decides to share a case including patients' identifying data that he was having difficulty with.		Factor loading
INT1	If you were Paul, you would share the case with the group.	.88
INT2	I could see myself sharing the case with the group if I were in Paul's situation.	.86
PC1	Paul would probably be caught sharing the case with the group.	.81
PC2	There is a high probability that Paul's institution would discover that he shared the case with the group.	.81
PS1	If caught sharing the case with the group, Paul would be severely reprimanded.	.85
PS2	If caught sharing the case with the group, Paul's punishment would be severe.	.84

Security Measurement

Security Countermeasure Items		Factor loading
PCM1	My institution has specific guidelines for password use.	.68
PCM2	My institution has a policy for downloading patient data to personal devices.	.71
PCM3	My institution has a formal policy that forbids employees from accessing health records that they are not authorized to access.	.69
PCM4	My institution has specific policies for employees sharing patient data in a social network.	.72
PCM5	My institution educates employees about computer security responsibilities and policies.	.77
PCM6	My institution trains and briefs employees about the need for maintaining patient data privacy.	.82
PCM7	My institution makes employees aware of the consequences of patient data misuse.	.71
TCM1	My institution monitors all access to patient data.	.78
TCM2	My institution logs all access to patient data.	.72
TCM3	My institution conducts regular audits to ensure that all access to patient data is appropriate and legitimate.	.77
TCM4	My institution tracks all downloads of patient data.	.83
TCM5	My institution looks for suspicious behavior in the patient data access logs.	.82

ESSAY 2: SCENARIOS AND INSTRUMENT (Scenarios are the same but items and factor loadings are different)

<u>Scenario 1: Password Use</u>

		Factor loading
Ann has just changed her password as required by current IT policy. She needed to look up a patient's lab results. Her password was rejected and after several attempts, her account was locked. She noted that her colleague had left her computer unattended and logged in, and that she could check the lab results on her colleague's account.		
INT1	If you were Ann, you would use your colleague's account to look up a patient's lab results.	.84
INT2	I could see myself using my colleague's account to look up a patient's lab results if I were in Ann's situation.	.85
MB	It is morally acceptable for Ann to use her colleague's account to look up a patient's lab results.	.66
SN	Ann's colleagues think it is acceptable for Ann to use her colleague's account to look up a patient's lab results.	.72
PC1	Ann would probably be caught using her colleague's account to look up a patient's lab results.	.67
PC2	There is a high probability that Ann's institution would discover that Ann used her colleague's account to look up a patient's lab result.	.69
PS1	If caught using her colleague's account to look up a patient's lab results, Ann would be severely reprimanded.	.81
PS2	If caught using her colleague's account to look up a patient's lab results, Ann's punishment would be severe.	.79

<u>Scenario 2: Download to personal device</u>

		Factor loading
Pete was assigned to present a patient case. He found the process of assembling all the lab results from all admissions and outpatient visits to be tedious. He could compile this much quicker if he used an iPad to take pictures of the lab results screens. These images included the patient's name and the medical record number.		
INT1	If you were Pete, you would use your iPad to take pictures of the lab results screens.	.83
INT2	I could see myself using my iPad to take pictures of the lab results screens if I were in Pete's situation.	.85
MB	It is morally acceptable for Pete to use his iPad to take pictures of the lab results screens.	.69
SN	Pete's colleagues think it is acceptable for him to use his iPad to take pictures of the lab results screens	.73
PC1	Pete would probably be caught using his iPad to take pictures of the lab results screens.	.64
PC2	There is a high probability that Pete's institution would discover that he used his iPad to take pictures of the lab result screens.	.69
PS1	If caught using his iPad to take pictures of the lab results screens, Pete would be severely reprimanded.	.83
PS2	If caught using his iPad to take pictures of the lab results screens, Pete's punishment would be severe.	.82

Scenario 3: Unauthorized access

Kate was searching for a patient's health information in her organization's Electronic Health Records. When she typed in the patient's name, several similar names came up and she clicked on the one she thought was her patient. Instead, she found that it was the record of her supervisor, who had a similar name.		Factor loading
INT1	If you were Kate, you would look through the supervisor's record.	.81
INT2	I could see myself looking through the supervisor's record if I were in Kate's situation.	.74
MB	It is morally acceptable for Kate to look through her supervisor's record.	.52
SN	Kate's colleagues think it is acceptable for Kate to look through her supervisor's record.	.65
PC1	Kate would probably be caught looking through the supervisor's record.	.79
PC2	There is a high probability that Kate's institution would discover that Kate looked through her supervisor's record.	.83
PS1	If caught looking through her supervisor's record, Kate would be severely reprimanded	.81
PS2	If caught looking through her supervisor's record, Kate's punishment would be severe.	.82

Scenario 4: Social Network Sharing

Paul has just accepted an invitation to join a closed group for health providers on a social network. He was told that he could share patients' history, x-rays, CT-scan, EKG, and labs reports of patients with the group if he needs help. The group includes medical students, interns, residents, and specialists. Paul decides to share a case including patients' identifying data that he was having difficulty with.		Factor loading
INT1	If you were Paul, you would share the case with the group.	.84
INT2	I could see myself sharing the case with the group if I were in Paul's situation.	.84
MB	It is morally acceptable for Paul to share the case with the group.	.77
SN	Paul's colleagues think it is acceptable for him to share the case with the group.	.76
PC1	Paul would probably be caught sharing the case with the group.	.75
PC2	There is a high probability that Paul's institution would discover that he shared the case with the group.	.76
PS1	If caught sharing the case with the group, Paul would be severely reprimanded.	.80
PS2	If caught sharing the case with the group, Paul's punishment would be severe.	.81

Security Measurement

Security Countermeasure Items		Factor loading
PCM1	My institution has specific guidelines for password use.	.56
PCM2	My institution has a policy for downloading patient data to personal devices.	.52
PCM3	My institution has a formal policy that forbids employees from accessing health records that they are not authorized to access.	.58
PCM4	My institution has specific policies for employees sharing patient data in a social network.	.57
PCM5	My institution educates employees about computer security responsibilities and policies.	.75
PCM6	My institution trains and briefs employees about the need for maintaining patient data privacy.	.73
PCM7	My institution makes employees aware of the consequences of patient data misuse.	.69
TCM1	My institution monitors all access to patient data.	.83
TCM2	My institution logs all access to patient data.	.81
TCM3	My institution conducts regular audits to ensure that all access to patient data is appropriate and legitimate.	.73
TCM4	My institution tracks all downloads of patient data.	.84
TCM5	My institution looks for suspicious behavior in the patient data access logs.	.86

Cultural Values Measurement

Hofstede's cultural values		Factor loading
Power Distance		
PD1	Supervisor should make most decisions without consulting subordinates.	.62
PD2	It is frequently necessary for supervisor to use authority and power when dealing with subordinates.	.60
PD3	Supervisors should seldom ask for the opinion of subordinates.	.71
PD4	Subordinate should not disagree with management decisions.	.61
PD5	Supervisors should not delegate important tasks to subordinates.	.50
Individualism/Collectivism		
IC1	Group welfare is more important than individual welfare.	.73
IC2	Being accepted as a member of a group is more important than being independent.	.67
IC3	Group success is more important than individual success.	.77
IC4	Individuals should pursue their goals after considering the welfare of the group.	.42
IC5	Being loyal to a group is more important than individual gain.	.71
Uncertainty Avoidance		
UA1	It is important to have job requirements and instructions spelled out in detail so that people always know what they are expected to do.	.67
UA2	Supervisors expect subordinates to closely follow instructions and procedures.	.65
UA3	Rules and regulations are important because they inform employees what the organization expects of them.	.79
UA4	Standard operating procedures are important because they inform employees what are expected of them.	.83
UA5	Instructions for operations are important for employees on the job.	.79
Long Term Orientation		
LTO1	I plan for the long term.	.71
LTO2	I work hard for success in the future.	.81
LTO3	I don't mind giving up today's fun for success in the future.	.75
LTO4	Persistence is important to me.	.75
LTO5	The quality of my future is important to me.	.64

ESSAY 3: INSTRUMENT

Construct		Factor loading
Individual benefits: Self understanding		
SU1	By organizing my thoughts before posting, I understand my health problem better.	.67
SU2	I understand my feelings about my health problem better by posting them online.	.76
SU3	I understand my health problems better when I post them online.	.82
Individual benefits: Emotional benefits		
EB1	I discuss my feelings toward my health problems in my online posts.	.62
EB2	Stress related to my health problems are released when I post online.	.64
EB3	I get over my health problems when I post online.	.65
EB4	I enjoy reading comments from others on my online posts about my health problems	.75
EB5	I enjoy seeing people click "Like" on my status when I post online about my health problems	.66
Individual benefits: Communication depth		
CD1	I am comfortable posting details online about my health problems	.66
CD2	I disclose sensitive issues about my health problems	.61
CD3	I use this channel to communicate in-depth about my health problems with friends and/or the public	.78
CD4	I am normally reluctant to communicate directly with people about my health problems but this channel helps me in disclosing it	.62
CD5	With this channel, I can talk exactly how I feel about my health problems	.76
CD6	I tell online friends about my health problems in-depth	.72
CD7	I disclose both positive and negative sides of my health problems online	.68
Social benefits: Feedback quality		
FQ1	People do not hesitate to respond online to posts about health problems	.69
FQ2	People respond online frankly to posts about health problems	.73
FQ3	People empathize and sympathize with those who post about their health problems online.	.65
FQ4	People offer information online that relates to the health problems posted online.	.70
FQ5	People suggest social network health groups that include people who have the same health problems to those who post.	.62
FQ6	People encourage those who post online about health proem to fight to their health problems.	.73
Social benefits: Acceptance		
AT1	I find online friends who understand me	.60
AT2	I find online friends who have the same health problems	.62

AT3	By clicking "Like", leaving comments and sharing my status, people confirm that they accept my health problem	.65
Social benefits: Reassurance		
RE1	Online viewers support me	.75
RE2	Online viewers reassure me that I have the right treatment	.78
RE3	Online viewers reassure me to continue my treatment	.80
RE4	I rely on online viewers to give me suggestions about treatment	.58
Individual risks: Information privacy concern		
IP1	My private and personal information is not well protected by social network sites	.76
IP2	My private information posted online might be passed on to people who have a malicious attitude towards me	.81
IP3	My private information posted online might be released outside my social network	.76
IP4	I set my privacy settings to limit who can view my profile, post and photos in my social networks	.50
IP5	I do not express much about myself on social network sites	.53
IP6	I do not use my real name and personal data on my social network sites	.58
Individual risks: PHI privacy concern		
PP1	I believe that the privacy of my health information is not well protected by social network sites	.55
PP2	I am concerned that personal health information posted online might be released to an insurance company	.62
PP3	I do not post about issues related to my health whether they are serious or not	.61
Individual risks: Mistrust in SNS		
TS1	Social network sites might use my health information for other purposes	.68
TS2	I do not trust the security of social network sites	.62
TS3	I do not trust the people who are regularly use social network sites	.58
Social risks: Social privacy risks		
SP1	People using social network sites might use my health problems for their individual benefit	.68
SP2	People might intrude on my personal life if they know that I have health problems	.68
SP3	People might ask me for more details about health problems that I post	.63
SP4	If my colleagues, friends and family know what I post my health problems online, it will affect my relationship with them	.50
Social risks: Criticism		
SC1	People might criticize me if I post my health problems online	.67
SC2	People might think that I want attention if I post my health problems online	.70
SC3	People might have negative attitudes to me when they see I post my health problems online	.79
SC4	People might gossip about me and the health problems that I post online	.74

	Social risks: Ostracism	
SO1	My colleagues, friends and family will avoid me if they know I have stigmatized health problems	.61
SO2	People might have negative reactions toward me if they know that I have stigmatized health problems	.65
	Disclosure media characteristics: Ease of use	
CE1	The ease of use of social network sites engages me to post more	.75
CE2	I post on social network sites that have easy to use functionality	.75
	Disclosure media characteristics :Social influence	
CI1	I use the same social network sites that people around me use	.40
CI2	I post my health problems on social networks sites that people around me use regularly	.74
CI3	I post my health problems on informal social network sites	.76
CI4	I post my health problems on social network sites that people normally use to post personal information and/or health problems	.79
	Medical condition characteristic: Social norms	
DS1	Self-posting about stigmatized health problems should be encouraged.	.72
DS2	Self-posting about stigmatized health problems is acceptable.	.80
DS3	Self-posting about psychiatric problems should be encouraged.	.80
DS4	Self-posting about psychiatric problems is acceptable.	.81
DS5	Self-posting about chronic health problems should be encouraged	.75
DS6	Self-posting about chronic health problems is acceptable.	.80
	Self-disclosure propensity	
INT1	I would post my health problems online.	.75
INT2	I could see myself posting my health problems online.	.72

APPENDIX B: PSYCHOMETRICS

(These scores were used in Essay 1 and Essay 2)

Individual items were summed across the four scenarios to create composite scores for perceived certainty, perceived severity, moral belief, social norms, and propensity to misuse medical data. For example,

$$PC1 = PC1(scenario1) + PC1(scenario2) + PC1(scenario3) + PC1(scenario4)$$

$$PC2 = PC2(scenario1) + PC2(scenario2) + PC2(scenario3) + PC2(scenario4)$$

The same procedure was applied to individual items for PS, MB, SN, and INT. The composite values obtained through the summation were used in the structural equation modeling.

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Education

MD, 1997 – 2003.
Chiangmai University, Chiangmai, Thailand
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Child and Adolescent Psychiatry Residency Training, 2004 - 2008
Siriraj Hospital, Mahidol University, Bangkok, Thailand

PhD, Biomedical& Healthcare Informatics, 2011 – 2014
University of Wisconsin-Milwaukee, Milwaukee, USA

Membership in Professional Bodies

2003   Membership of Thai General Medical Council
2004   Membership of the Thai Psychiatric Association
2004   Membership of the Child and Adolescent Psychiatric Society of Thailand
2008   Membership of the Royal College of Psychiatrist of Thailand

Employment History

Intern (Medicine).
Nakornping Hospital, Chiangmai, Thailand, 2003-2004.

Resident (Child and adolescent psychiatry)
Siriraj Hospital, Mahidol University, Bangkok, Thailand, 2004 – 2008.
- Provide psychiatric diagnosis and treatment to children and adolescents at the hospital clinic.
- Also see adult psychiatric patients as part of hospital's psychiatric team.
- Run a community psychiatry project with the team. Specializing in school mental health and consultation.

Lecturer (Child and adolescent psychiatry)
Lampang Hospital, Lampang, Thailand, 2008 – 2010.
- Provide lectures for medical students, nurses, and paramedics.
- Run a parent training group in the clinic.
- Project leader for Floortime, an autistic program that partners with Siriraj Hospital and National Institute for Child and Family Development, Mahidol University.
- Sub- committee of Funded for disability children in Lampang′s project.
- Consultant of girl′s rehabilitation centre and emergency house.
- Committee of Women and Children′s right protection, Lampang Province
- Committee of One Stop Service and Crisis Center(OSCC) for battered women and Children of Lampang Hospital.

Graduate Assistant
University of Wisconsin-Milwaukee, 2011 – 2014.
- Research Assistant in the Project of Southeast Asian Females' Attitudes of Intimate Partner Violence, College of Nursing UWM, USA
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Publications
1. Piyasil V, Ketuman P, Prubrukarn R, Pochanakaew S, Dumrongphol H, Pityaratstian N, Arunothong W, et al. Psychiatric problems in children and adolescents at 1 year after the tsunami disaster. Thai J Pediatrics 2007; 46(1): 36-41.
2. Kaewpornsawan T.& Arunothong A. Youths′ opinion about good friend qualification. Journal of the Psychiatric Association of Thailand 2010; 55(2): 133-142.
3. Arunothong W.&Waewsawangwong S. An Evaluation Study of Parent Management Training (PMT) Program in Northern Thai. ASEAN Journal of Psychiatry 2012; 13(1): 31-48
4. Arunothong W. &Ittasakul P.Psychiatric Computer Interviews:How Precise, Reliable And Accepted Are They? ASEAN Journal of Psychiatry 2012; 13(1): 69-80
5. Arunothong W. &Suntisrivaraporn B. Ontologies for psychiatry: what have been done so far? In *Proceedings of The First ASIAN Conference on Information Systems (ACIS 2012)* [CD-ROM], Siem Reap, Cambodia, 2012.

Poster Presentation Sessions
1. Arunothong W.,Kaewpornsawan T.,Sinratchatanan A.,&Inta P., et al Youths′ opinion about good friend qualification. Poster presented at center for the promotion of national strength on moral ethics and values on Aug 28-29,2007.
2. Arunothong W.&Waewsawangwong S. An Evaluation Study of Parent Management Training (PMT) Program in Northern Thai. Poster presented at IACAPAP Paris 2012 on Jul 21-25, 2012.

3. Thongpriwan V.,Arunothong W.,&Xiong B. Southeast Asian Female College Students' Perceptions of Intimate Partner Violence and their Recognition of Personal Vulnerability. The poster presented at MNRS 2013 Annual Research Conference, Chicago, Illinois on March 7-10, 2013

Oral Presentation Sessions
1. Arunothong W.& Suntisrivaraporn B. Ontologies for Psychiatry: What have been done so far? Presented at ACIS conference Cambodia on Dec 6-8 2012.
2. Arunothong W. &Thongpriwan V..Southeast Asian Female College Students' attitudes toward male victimization among intimate partner violence context. Presented at World Congress of Asian Psychiatry (WCAP 2013), Bangkok, Thailand Aug 20-23,2013

Awards& Honors
1. International Young Psychiatric Fellowship Program: 65th ANCIPS, NIMHANS Bangalore, India Jan 10-13,2013
2. Young Psychiatric Fellowship Program: World Congress of Asian Psychiatry (WCAP 2013), Bangkok, Thailand Aug 20-23,2013
3. Royal Thai Scholarship for studying PhD. program in Biomedical& Healthcare Informatics, USA 2011-2014