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SEEING THE FOREST AND THE TREES: A META-ANALYSIS OF THE ANTECEDENTS TO INFORMATION SECURITY POLICY COMPLIANCE

W. Alec Cram
Bentley University, 175 Forest Street,
Waltham, MA 02452 U.S.A. {wcram@bentley.edu}

John D'Arcy
Department of Accounting and MIS, University of Delaware, 356 Purnell Hall
Newark, DE 19716 U.S.A. {jdarcy@udel.edu}

Jeffrey G. Proudfoot
Bentley University, 175 Forest Street,
Waltham, MA 02452 U.S.A. {jproudfoot@bentley.edu}

Appendix A

Included Studies

Table A1.	Papers Included in the Meta-Analysis				
Authors (Year)[a]	**Publication Name**	**Publication Type**	**Sample Size(s)**	**Primary Theoretical or Conceptual Base**	**Antecedent Categories Examined**
Abed et al. (2016)	Americas Conference on Information Systems	Conference	275	Cognitive dissonance theory, technology acceptance model, expectation confirmation theory, IS continuance model	Attitude Perceived usefulness Normative beliefs SETA
Al-Omari et al. (2013)	Hawaii International Conference on System Sciences	Conference	445	Theory of planned behavior	Attitude Normative beliefs Personal norms & ethics
Al-Omari et al. (2012a)	Americas Conference on Information Systems	Conference	878	Theory of planned behavior	Attitude Normative beliefs Self-efficacy SETA
Al-Omari et al. (2012b)	Hawaii International Conference on System Sciences	Conference	205	Theory of planned behavior, theory of reasoned action, rational choice theory, technology acceptance model	Detection certainty Normative beliefs Perceived ease of use Perceived usefulness Self-efficacy SETA

Table A1. Papers Included in the Meta-Analysis (Continued)

Authors (Year)[a]	Publication Name	Publication Type	Sample Size(s)	Primary Theoretical or Conceptual Base	Antecedent Categories Examined
Arunothong (2014)	Ph.D. Dissertation	Dissertation	613	Social exchange theory, social penetration theory	Detection certainty Punishment severity
Aurigemma and Leonard (2015)	Journal of Information Systems Security	Journal	221	Affective organizational commitment, theory of planned behavior, rational choice theory	Attitude Normative beliefs Perceived benefits Response cost Self-efficacy
Aurigemma and Mattson (2014)[d]	Americas Conference on Information Systems	Conference	239	Theory of planned behavior, deterrence theory	Attitude Punishment expectancy Punishment severity
Aurigemma and Mattson (2017a)[d]	Information & Computer Security	Journal	239	Deterrence theory, theory of planned behavior, rational choice theory	Normative beliefs Self-efficacy
Aurigemma and Mattson (2017b)[d]	Computers & Security	Journal	239	Theory of planned behavior	Attitude Normative beliefs Self-efficacy
Bauer and Bernroider (2017)	Data Base for Advances in Information Systems	Journal	97	Theory of reasoned action, neutralization theory	Attitude Normative beliefs SETA
Boss et al. (2009)	European Journal of Information Systems	Journal	1671	Social influence theory, organismic integration theory, agency theory, control theory	Detection certainty Reward
Boss et al. (2015)[b]	MIS Quarterly	Journal	104, 327	Protection motivation theory	Resource vulnerability Response cost Response efficacy Rewards[g] Self-efficacy Threat severity
Brady (2010)	Ph.D. Dissertation	Dissertation	76	Theory of reasoned action, theory of planned behavior	Organizational support Self-efficacy SETA
Bulgurcu et al. (2010)	MIS Quarterly	Journal	464	Theory of planned behavior, rational choice theory, deterrence theory	Attitude Normative beliefs Perceived benefits Punishment expectancy Rewards Response cost Resource vulnerability Self-efficacy SETA
Burns et al. (2018)	Decision Sciences	Journal	411	Expectancy theory	Attitude Self-efficacy SETA Response efficacy
Chan et al. (2005)	Journal of Information Privacy & Security	Journal	104	None noted	Organizational support Self-efficacy
Chen et al. (2016)	Journal of Computer Information Systems	Journal	231	Awareness-motivation-capability framework	Punishment severity Rewards Self-efficacy SETA

Table A1.   Papers Included in the Meta-Analysis (Continued)

Authors (Year)[a]	Publication Name	Publication Type	Sample Size(s)	Primary Theoretical or Conceptual Base	Antecedent Categories Examined
Cheng et al. (2013)	Computers & Security	Journal	185	Social control, deterrence theory	Normative beliefs Personal norms & ethics Punishment expectancy Punishment severity
Cheng et al. (2014)	Computers in Human Behavior	Journal	230	Deterrence theory, neutralization theory	Detection certainty Perceived benefits Punishment severity
Chu et al. (2015)	Journal of Business Ethics	Journal	208	Theory of planned behavior	Attitude Normative beliefs Self-efficacy
D'Arcy (2005)[c]	Ph.D. Dissertation	Dissertation	238, 269	Deterrence theory	Detection certainty Punishment expectancy Punishment severity Self-efficacy SETA
D'Arcy and Greene (2014)	Information Management & Computer Security	Journal	127	Social exchange theory	Detection certainty Organizational support
D'Arcy et al. (2014)	Journal of Management Information Systems	Journal	539	Coping theory, moral disengagement theory, social cognitive theory	Personal norms & ethics Response cost
D'Arcy et al. (2018)	AIS Transactions on Replication Research	Journal	150	Moral disengagement theory, coping theory	Response cost
D'Arcy and Lowry (2019)[c]	Information Systems Journal	Journal	77, 628	Rational choice theory, theory of planned behavior	Attitude Detection certainty Normative beliefs Perceived benefits Personal norms & ethics Response cost Self-efficacy
Devgan (2012)	Ph.D. Dissertation	Dissertation	189	Theory of planned behavior	Normative beliefs Perceived ease of use Perceived usefulness Self-efficacy
Dinev and Hu (2007)	Journal of the Association for Information Systems	Journal	332	Theory of planned behavior	Attitude Normative beliefs Perceived ease of use Perceived usefulness Self-efficacy SETA
Dinev et al. (2009)	Information Systems Journal	Journal	227	Theory of planned behavior, rational choice theory, technology acceptance model, IS continuance model	Attitude Normative beliefs Perceived ease of use Perceived usefulness Self-efficacy SETA
Donalds (2015)	SIG GlobDev Pre-ECIS Workshop	Conference	137	Cybersecurity awareness and training	Organizational support SETA

Table A1. Papers Included in the Meta-Analysis (Continued)					
Authors (Year)[a]	**Publication Name**	**Publication Type**	**Sample Size(s)**	**Primary Theoretical or Conceptual Base**	**Antecedent Categories Examined**
Dugo (2007)	Ph.D. Dissertation	Dissertation	113	Theory of planned behavior, deterrence theory	Attitude Normative beliefs Punishment expectancy Punishment severity Self-efficacy
Foth (2012)	Journal of Public Health	Journal	557	Technology acceptance model, protection motivation theory	Attitude Normative beliefs Perceived ease of use Perceived usefulness Resource vulnerability Threat severity
Goo et al. (2014)	IEEE Transactions on Professional Communication	Journal	581	Safety climate and performance model	Normative beliefs Organizational support SETA
Guo and Yuan (2012)[e]	Information & Management	Journal	306	Deterrence theory, theory of reasoned action, social cognitive theory	Attitude
Guo et al. (2011)[e]	Journal of Management Information Systems	Journal	306	Composite behavior model, theory of reasoned action, theory of planned behavior	Attitude Normative beliefs Perceived benefits Punishment expectancy Resource vulnerability
Haeussinger and Kranz (2013)	International Conference on Information Systems	Conference	475	Deterrence theory, theory of planned behavior	Normative beliefs SETA
Han et al. (2017)[c]	Computers & Security	Journal	111, 102	Rational choice theory	Perceived benefits Response cost SETA
Hanus (2014)	Ph.D. Dissertation	Dissertation	172	Threat avoidance theory, protection motivation theory	Attitude Punishment expectancy Resource vulnerability Response cost Rewards Self-efficacy SETA Threat severity
Harrington (1996)[c]	MIS Quarterly	Journal	219	Deterrence theory	Personal norms & ethics
Herath and Rao (2009a)[f]	Decision Support Systems	Journal	312	Deterrence theory, protection motivation theory	Detection certainty Normative beliefs Punishment severity Response efficacy
Herath and Rao (2009b)[f]	European Journal of Information Systems	Journal	312	Deterrence theory, agency theory	Attitude Normative beliefs Resource vulnerability Response efficacy Self-efficacy Threat severity
Herath et al. (2018)	Information Technology & People	Journal	233	Social cognitive theory	SETA

Authors (Year)[a]	Publication Name	Publication Type	Sample Size(s)	Primary Theoretical or Conceptual Base	Antecedent Categories Examined
Table A1. Papers Included in the Meta-Analysis (Continued)					
Hovav and D'Arcy (2012)[c]	Information & Management	Journal	366, 360	Deterrence theory	Detection certainty Punishment expectancy Punishment severity
Hovav and Putri (2016)	Pervasive & Mobile Computing	Journal	230	Reactance theory, psychological contract theory, protection motivation theory, organizational justice theory	Response cost Response efficacy SETA
Hu et al. (2012)	Decision Sciences	Journal	148	Theory of planned behavior	Attitude Normative beliefs Organizational support Self-efficacy
Huang et al. (2016)	Pacific Asia Conference on Information Systems	Conference	234	Theory of planned behavior, social cognition theory	Self-efficacy SETA
Humaidi and Balakrishnan (2018)	Health Information Management Journal	Journal	454	Theory of planned behavior	Organizational support Self-efficacy
Hwang et al. (2017)	Online Information Review	Journal	415	Prospect theory, protection motivation theory	Normative beliefs Response cost Self-efficacy SETA
Ifinedo (2012)	Computers & Security	Journal	124	Theory of planned behavior, protection motivation theory	Attitude Normative beliefs Resource vulnerability Response cost Response efficacy Self-efficacy Threat severity
Ifinedo (2014a)	Information & Management	Journal	124	Theory of planned behavior, social cognitive theory, social bond theory	Personal norms & ethics
Ifinedo (2014b)	Mediterranean Conference on Information Systems	Conference	201	Social cognitive theory	Rewards Self-efficacy SETA
Ifinedo (2016)	Information Systems Management	Journal	176	Deterrence theory, rational choice theory, organizational climate perspective	Detection certainty Organizational support Punishment severity Response cost
Jaafar and Ajis (2013)	International Journal of Business and Social Science	Journal	400	Social cognitive theory	Organizational support Self-efficacy
Jenkins (2013)[b]	Ph.D. Dissertation	Dissertation	332, 162	Theory of planned behavior, field theory	Attitude Normative beliefs Self-efficacy
Jenkins and Durcikova (2013)	International Conference on Information Systems	Conference	194	Theory of planned behavior, dual-task interference theory	Attitude Normative beliefs Self-efficacy SETA

Table A1. Papers Included in the Meta-Analysis (Continued)

Authors (Year)[a]	Publication Name	Publication Type	Sample Size(s)	Primary Theoretical or Conceptual Base	Antecedent Categories Examined
Jenkins et al. (2010)	International Conference on Information Systems	Conference	108	Theory of planned behavior, dual-processing theory, yield shift theory, expectancy value theory	Attitude Organizational support Perceived ease of use Response Cost Self-efficacy
Jeon and Hovav (2015)[c]	HawaiiInternational Conference on System Sciences	Conference	40, 49	Psychological ownership, rational choice theory, deterrence theory	Detection certainty Perceived benefits Response cost Self-efficacy
Johnston and Warkentin (2010)	MIS Quarterly	Journal	275	Protection motivation theory, fear appeals model	Resource vulnerability Response efficacy Self-efficacy Threat severity
Johnston et al. (2015)	MIS Quarterly	Journal	559	Protection motivation theory, deterrence theory	Punishment expectancy Punishment severity Resource vulnerability Response efficacy Self-efficacy Threat severity
Johnston et al. (2010)	Americas Conference on Information Systems	Conference	435	Social learning theory	Self-efficacy
Kam et al. (2015)[c]	European Conference on Information Systems	Conference	127, 121	Competing values framework	Normative beliefs
Kinnunen (2016)[c]	MS Thesis	Thesis	119, 111, 118, 112	Deterrence theory, protection motivation theory, stress-as-offense-to-self theory	Punishment expectancy Response cost Response efficacy Self-efficacy Threat severity
Kranz and Haeussinger (2014)	International Conference on Information Systems	Conference	444	Theory of planned behavior, organismic integration theory, self-determination theory	Attitude Normative beliefs Self-efficacy
Kuo et al. (2017)	Journal of Medical Systems	Journal	262	Deterrence theory	Detection certainty Normative beliefs Punishment expectancy Punishment severity
Lebek et al. (2014)	International Conference on Information Systems	Conference	208	Theory of planned behavior, expectancy-valence theory	Organizational support Personal norms & ethics
Lee et al. (2016)	Pacific Asia Conference on Information Systems	Conference	211	Rational choice theory	Detection certainty
Li and Luo (2017)[c]	Unpublished	Conference	265	Not noted	Personal norms & ethics Punishment expectancy Punishment severity
Li et al. (2014)	Information Systems Journal	Journal	241	Organizational justice	Punishment expectancy Punishment severity Personal norms & ethics

Table A1. Papers Included in the Meta-Analysis (Continued)

Authors (Year)[a]	Publication Name	Publication Type	Sample Size(s)	Primary Theoretical or Conceptual Base	Antecedent Categories Examined
Li, Zhang, and Sarathy (2010)	Decision Support Systems	Journal	246	Rational choice theory	Detection certainty Perceived benefits Personal norms & ethics Punishment severity Normative beliefs Resource vulnerability
Li and Cheng (2013)	Pacific Asia Conference on Information Systems	Conference	428	Rational choice theory	Detection certainty Perceived benefits Punishment severity Resource vulnerability
Liao et al. (2009)	Journal of Computer Information Systems	Journal	205	Theory of planned behavior, deterrence theory, theory of ethics	Attitude Normative beliefs Punishment expectancy Punishment severity Self-efficacy
Lowry et al. (2015)	Information Systems Journal	Journal	533	Fairness theory, reactance theory	Punishment expectancy Punishment severity SETA
Mani et al. (2015)	Americas Conference on Information Systems	Conference	105	Protection motivation theory	Resource vulnerability Response efficacy Response cost Self-efficacy Threat severity
Martinez (2015)	Ph.D. Dissertation	Dissertation	106	Theory of planned behavior	Attitude Normative beliefs Self-efficacy
Moody et al. (2018)[b]	MIS Quarterly	Journal	274, 393	Theory of reasoned action, neutralization techniques, health belief model, theory of planned behavior, theory of interpersonal behavior, protection motivation theory, deterrence theory, theory of self-regulation, extended parallel processing model, control balance theory	Attitude Normative beliefs Punishment expectancy Punishment severity Resource vulnerability Response efficacy Rewards Self-efficacy Threat severity
Moquin and Wakefield (2016)	Journal of Computer Information Systems	Journal	138	Protection motivation theory, theory of planned behavior	Attitude Normative beliefs Punishment expectancy SETA
Ormond et al. (2019)[c]	Unpublished	Unpublished	331	TBD	Attitude
Pahnila et al. (2013)[c]	Pacific Asia Conference on Information Systems	Conference	340, 173	Protection motivation theory	Resource vulnerability Response efficacy Self-efficacy Threat severity
Park et al. (2017)	Computers & Security	Journal	123	Deterrence theory	Personal norms & ethics Punishment severity SETA
Peace et al. (2003)	Journal of Management Information Systems	Journal	201	Theory of planned behavior, expected utility theory, deterrence theory	Attitude Normative beliefs Punishment expectancy Punishment severity Self-efficacy

Table A1.	Papers Included in the Meta-Analysis (Continued)				
Authors (Year)[a]	Publication Name	Publication Type	Sample Size(s)	Primary Theoretical or Conceptual Base	Antecedent Categories Examined
Putri and Hovav (2014)	European Conference on Information Systems	Conference	230	Reactance theory, protection motivation theory, organizational justice theory	Organizational support Response cost Response efficacy SETA Threat severity
Safa et al. (2016)	Computers & Security	Journal	296	Social bond theory, involvement theory	Attitude Personal norms & ethics SETA
Shropshire et al. (2015)	Computers & Security	Journal	170	Theory of reasoned action, technology acceptance model	Perceived ease of use Perceived usefulness
Sikolia et al. (2016)	Americas Conference on Information Systems	Conference	110	Protection motivation theory, theory of reasoned action, cognitive evaluation theory	Resource vulnerability Response efficacy Self-efficacy Threat severity
Siponen et al. (2014)	Information & Management	Journal	669	Protection motivation theory, theory of reasoned action, cognitive evaluation theory	Attitude Normative beliefs Resource vulnerability Response efficacy Rewards Self-efficacy Threat severity
Siponen and Vance (2010)	MIS Quarterly	Journal	395	Neutralization theory	Personal norms & ethics Punishment expectancy
Sommestad et al. (2015)	Information and Computer Security	Journal	306	Theory of planned behavior, protection motivation theory	Attitude Normative beliefs Resource vulnerability Response efficacy Response cost Self-efficacy Threat severity
Son (2011)	Information & Management	Journal	602	Deterrence theory, intrinsic and extrinsic motivation models	Punishment expectancy Punishment severity
Son and Park (2016)	International Journal of Information Management	Journal	209	Deterrence theory, procedural justice	Punishment expectancy Punishment severity
Talib and Dhillon (2015)	International Conference on Information Systems	Conference	290	Intrinsic motivation/ empowerment model, structural empowerment theory	Self-efficacy SETA
Vance et al. (2012)	Information & Management	Journal	210	Protection motivation theory	Resource vulnerability Response cost Response efficacy Rewards[g] Self-efficacy Threat severity
Wall et al. (2013)	Journal of Information Privacy & Security	Journal	95	Self-determination theory, psychological reactance theory	Response efficacy Self-efficacy
Warkentin et al. (2011)	European Journal of Information Systems	Journal	202	Social learning theory	Self-efficacy

Table A1. Papers Included in the Meta-Analysis (Continued)					
Authors (Year)[a]	Publication Name	Publication Type	Sample Size(s)	Primary Theoretical or Conceptual Base	Antecedent Categories Examined
Yazdanmehr and Wang (2016)	Decision Support Systems	Journal	201	Norm activation theory, social norms theory	Detection certainty Normative beliefs Personal norms & ethics
Zhang et al. (2009)	Information Management & Computer Security	Journal	176	Risk compensation theory, theory of planned behavior	Attitude Normative beliefs Self-efficacy

[a]Where a conference paper or dissertation was subsequently published as a journal article using the same dataset, we excluded the earlier publication to avoid a duplication of data.

[b]Two separate studies were conducted in Boss et al. (2015); Jenkins (2013); and Moody et al. (2018). In the Boss et al. paper, the rewards category was only applicable to the second study. In the Moody et al. study, the attitude, normative beliefs, punishment severity, resource vulnerability, and self-efficacy categories were only applicable to the first study.

[c]A single study was conducted, but multiple scenarios, samples, or groupings were utilized. In Harrington (1996), five scenarios were used for the personal norms & ethics category. In Kinnunan (2016), four scenarios were used for the punishment expectancy, response cost, response efficacy, self-efficacy, and threat severity categories. In Li and Luo (2017), three scenarios were used for the personal norms & ethics, punishment expectancy, and punishment severity categories. In D'Arcy (2005) (detection certainty, punishment expectancy, punishment severity, self-efficacy, SETA), Han et al. (2017) (SETA, response cost, perceived benefits), Hovav and D'Arcy (2012) (detection certainly, punishment expectancy, punishment severity); Jeon and Hovav (2015) (detection certainty, perceived benefits, response cost, self-efficacy); Kam et al. (2015) (normative beliefs); Ormond et al. (2019) (attitude), and Pahnila et al. (2013) (resource vulnerability, response efficacy, self-efficacy, threat severity), two groupings or independent samples were used. In D'Arcy and Lowry (2019), one within-person level grouping used the attitude, normative beliefs, and response cost categories, while a second between-individual level grouping used the detection certainty, normative beliefs, perceived benefits, personal norms & ethics, and self-efficacy categories.

[d]The same sample of 239 participants was used in Aurigemma and Mattson (2014, 2017a, 2017b); however, the data utilized in our analysis was unique: the 2014 paper used compliance with a flash media policy as the dependent variable, the 2017a paper used the same dependent variable, but with some new independent variables, and the 2017b paper used a tailgating policy as the dependent variable.

[e]Guo et al. (2011) and Guo and Yuan (2012) use the same dataset, but only some of the independent variables overlap between the two studies. Where a variable is duplicated, we used the data from the 2011 paper. For the attitude category, we used data from the "attitude toward security policy" construct in the 2011 paper and the "personal self-sanctions" construct in the 2012 paper.

[f]Herath and Rao (2009a, 2009b) use the same dataset, but only some of the independent variables overlap between the two studies. Where a variable is duplicated, we used the data from the 2009a paper. For the response efficacy category, we used data from the "response efficacy" construct in the 2009b paper and the "perceived effectiveness" construct in the 2009a paper.

[g]Boss et al. (2015) and Vance et al. (2012) measure maladaptive rewards (i.e., the benefits of not complying with a security policy). The correlations for these studies were reversed to match those studies that measured rewards.

Appendix B

Excluded Papers

The listing of papers in the table below highlights publications that were excluded from our meta-analysis, including details of our rationale. Our aim is to provide transparency into our exclusion process, although we note that the listing is a representative collection of excluded papers, rather than a comprehensive listing of all excluded papers. The primary exclusion criteria noted in the "Methodology" section are reflected in the table below. We note that examples of our third exclusion criteria are separated below in terms of either "Duplicated data set" or "Did not report data for effect size calculation." Also of note is the category "Insufficient independent variable categorization," which was used during the analysis phase, when too few independent variables from a paper were also seen in other papers (thus leaving the variable uncategorized) and a meta-analysis was unable to be performed.

Table B1. Sample of Papers Excluded from the Meta-Analysis						
Authors (Year)	**Journal**	Exclusion Criteria 1	Exclusion Criteria 2	Exclusion Criteria 3a	Exclusion Criteria 3b	Exclusion Criteria 4
Arunothong and Nazareth (2017)	Journal of Information Privacy and Security			X		
Anderson and Agarwal (2010)	MIS Quarterly	X				
Aurigemma and Mattson (2018)	Computers & Security	X				
Backhouse et al. (2006)	MIS Quarterly		X			
Balozian et al. (2019)	Journal of Computer Information Systems			X		
Baskerville et al. (2014)	Information Technology & People			X		
Bauer and Bernroider (2014)	Information Institute Conferences			X		
Belanger et al. (2017)	Information & Management			X		
Boss (2007)	PhD Dissertation				X	
Boss and Kirsch (2007)	International Conference on Information Systems				X	
Brown (2017)	PhD Dissertation			X		
Bulgurcu et al. (2009)	European and Mediterranean Conference on Information Systems					X
Burns et al. (2015)	AIS Transactions on Human-Computer Interaction			X		
Chen et al. (2012)	Journal of Management Information Systems			X		
Chen and Zahedi (2016)	MIS Quarterly	X				
Chu et al. (2018)	Journal of Business Ethics			X		
Crossler (2009)	PhD Dissertation	X				
Crossler et al. (2014)	Journal of Information Systems			X		
Crossler et al. (2017)	Journal of Information Systems					X
Culnan and Williams (2009)	MIS Quarterly		X			
D'Arcy and Devaraj (2012)	Decision Sciences				X	
D'Arcy and Hovav (2007)	Journal of Information Systems Security				X	
D'Arcy and Hovav (2009)	Journal of Business Ethics				X	
D'Arcy et al. (2009)	Information Systems Research				X	
Foth (2016)	European Journal of Information Systems			X		
Godlove (2011)	PhD Dissertation			X		
Greene and D'Arcy (2010)	Annual Symposium on Information Assurance				X	
Guo (2010)	PhD Dissertation				X	
Hamid et al. (2017)	Journal of Engineering and Applied Sciences			X		

Table B1. Sample of Papers Excluded from the Meta-Analysis (Continued)		Exclusion Criteria 1	Exclusion Criteria 2	Exclusion Criteria 3a	Exclusion Criteria 3b	Exclusion Criteria 4
Authors (Year)	**Journal**					
Herath et al. (2014)	Information Systems Journal	X				
Hovav (2017)	Hawaii International Conference on System Sciences			X		
Hsu et al. (2015)	Information Systems Research		X			
Hu et al. (2015)	Journal of Management Information Systems			X		
Humaidi et al. (2014)	IEEE Conference on e-Learning, e-Management, and e-Services				X	
Ifinedo (2017)	SIGMIS-Computer and People Research Conference			X		
Ifinedo (2018)	Information Resources Management Journal				X	
Johnston et al. (2016)	European Journal of Information Systems			X		
Karjalainen and Siponen (2011)	Journal of the Association for Information Systems		X			
Karlsson et al. (2017)	Information & Computer Security			X		
Kim et al. (2016)	Information & Management					X
Kim et al. (2014)	The Scientific World Journal			X		
Klein and Luciano (2016)	Journal of Information Systems and Technology Management			X		
Li, Sarathy, and Zhang (2010)	International Conference on Information Systems				X	
Li (2017)	PhD Dissertation			X		
Liang and Xue (2009)	MIS Quarterly		X			
Liang and Xue (2010)	Journal of the Association for Information Systems	X				
Liang et al. (2013)	Information Systems Research		X			
Liu (2015)	European Journal of Information Systems		X			
Lowry and Moody (2015)	Information Systems Journal			X		
Lowry et al. (2014)	Journal of Business Ethics					X
Moody and Siponen (2013)	Information & Management		X			
Mutchler (2012)	PhD Dissertation	X				
Myyry et al. (2009)	European Journal of Information Systems					X
Nsoh et al. (2015)	International Journal of Strategic Information Technology and Applications			X		
Posey et al. (2013)	MIS Quarterly		X			
Shephard and Mejias (2016)	International Journal of Human-Computer Interaction			X		
Silic et al. (2017)	Information & Management			X		
Smith et al. (2010)	MIS Quarterly		X			
Spears and Barki (2010)	MIS Quarterly		X			
Straub (1990)	Information Systems Research			X		
Talib (2015)	PhD Dissertation				X	
Turel et al. (2017)	Journal of Computer Information Systems		X			
Vance et al. (2014)	Journal of the Association for Information Systems		X			
Vance et al. (2013)	Journal of Management Information Systems			X		
Vance et al. (2015)	MIS Quarterly			X		
Wall et al. (2016)	Journal of the Association for Information Systems			X		
Wall and Palvia (2013)	Americas Conference on Information Systems				X	
Warkentin, Johnston et al. (2016)	Decision Support Systems	X				

Table B1. Sample of Papers Excluded from the Meta-Analysis (Continued)		Exclusion Criteria 1	Exclusion Criteria 2	Exclusion Criteria 3a	Exclusion Criteria 3b	Exclusion Criteria 4
Authors (Year)	**Journal**					
Warkentin, Walden et al. (2016b)	Journal of the Association for Information Systems		X			
Williams et al. (2014)	Journal of Organizational and End User Computing			X		
Willison and Backhouse (2006)	European Journal of Information Systems		X			
Willison et al. (2018)	Information Systems Journal			X		
Workman et al. (2008)	Computers in Human Behavior			X		
Workman and Gathegi (2007)	Journal for the American Society for Information Science and Technology			X		
Xue et al. (2011)	Information Systems Research		X			

Notes:
Exclusion Criteria 1: Not focused on security policy issues in an organizational context.
Exclusion Criteria 2: Dependent variable is not security policy compliance-specific.
Exclusion Criteria 3a: Did not report data for effect size calculation.
Exclusion Criteria 3b: Duplicated data set.
Exclusion Criteria 4: Insufficient independent variable categorization.

Appendix C

Independent Variable Categories in Our Meta-Analysis

Table C1. Category Definitions	
Category	**Definition**
Attitude	The degree to which the performance of the compliance behavior is positively valued by the employee. (Bulgurcu et al. 2010)
Detection certainty[a]	The likelihood that an act of noncompliance will be detected by management. (Herath and Rao 2009b)
Normative beliefs	Belief as to whether or not a significant person wants the individual to do the behavior in question. (Herath and Rao 2009b)
Organizational support	Information security is clearly important to the organization, as viewed by the actions and communications of top management. (D'Arcy and Greene 2014)
Perceived benefits	The overall expected favorable consequences of complying with a security policy. (Han et al. 2017)
Perceived ease of use	The degree to which employees believe that complying with a security policy will be free of effort. (Foth et al. 2012)
Perceived usefulness	The degree to which employees believe that complying with a security policy will enhance their job performance. (Foth et al. 2012)
Personal norms & ethics	Personal belief about the appropriateness of a behavior. (Li et al. 2014)
Punishment expectancy[a]	An employee's perception of the probability that they will be caught if they violate a security policy. (Li et al. 2014)
Punishment severity[b]	The harshness of the sanctions that result from an act of noncompliance. (Johnston et al. 2015)
Resource vulnerability	An employee's assessment of the probability of exposure to a substantial security threat. (Herath and Rao 2009b)
Response cost	Beliefs about how costly performing the recommended response will be. (Herath and Rao 2009b)
Response efficacy	The effectiveness of a recommended coping response in reducing a security threat. (Siponen et al. 2014)
Rewards[c]	The tangible (e.g., prizes) and/or intangible (e.g., acknowledgment from a superior) compensation received by an employee in return for compliance with the security policy. (Boss et al. 2009; Bulgurcu et al. 2010; Siponen et al. 2014)
Security Education, Training, and Awareness (SETA)	Ongoing efforts to provide users with general knowledge of the information security environment, developing the skills necessary to perform any required security procedures, and promoting awareness of day-to-day security issues within the organization. (D'Arcy et al. 2009; Furnell et al. 2002; Lee and Lee 2002; Whitman et al. 2001)
Self-efficacy	Self-confidence about the ability to perform a behavior. (Herath and Rao 2009b)
Threat severity	An employee's assessment of the consequences of the security threat. (Herath and Rao 2009b)

[a]The rationale for detection certainty being a distinct category from punishment expectancy is that organizational efforts to increase the certainty of detection (e.g., security audits and computer monitoring) do not necessarily equate to increased expectations of punishment. This view is asserted in the seminal DT literature (Gibbs 1975; Tittle 1980). As well, several prior security policy compliance studies support the distinctiveness of constructs related to detection certainty versus those related to punishment perceptions (e.g., D'Arcy et al. 2009; Herath and Rao 2009a, 2009b; Ifinedo 2016; Li and Cheng 2013). Our results align with this view as the effect size for detection certainty was .10 larger than that of punishment expectancy (see Table 3) and exhibited stronger relative importance (Table 7).

[b]A small number of studies combined the measurement items for punishment certainty and punishment severity into a single construct (D'Arcy et al. 2014; D'Arcy and Lowry 2019; Herath et al. 2018; Hovav and Putri 2016). In these cases, we did not code the variable into either the punishment certainty of punishment severity category; it was ungrouped for our analysis.

[c]Included in this category is the concept of "maladaptive rewards," which refer to the rewards associated with not complying with a security policy (Boss et al. 2015; Vance et al. 2012)..

Appendix D

Moderators by Paper

Table D1. Moderator Details by Paper

Authors (Year)	Moderator #1		Moderator #2*		Moderator #3		Moderator #4**		
	Policy Compliance	Policy Violation	Actual Compliance	Intended Compliance	General Policy	Specific Policy	Asia-Pacific	Europe	North America
Abed et al. (2016)	X			X	X				
Al-Omari et al. (2013)	X			X	X				
Al-Omari et al. (2012a)	X			X	X				
Al-Omari et al. (2012b)	X			X	X				
Arunothong (2014)		X		X		X			
Aurigemma and Leonard (2015)	X			X	X				X
Aurigemma and Mattson (2014)	X			X	X				X
Aurigemma and Mattson (2017a)	X			X		X			X
Aurigemma and Mattson (2017b)	X			X		X			X
Bauer and Bernroider (2017)	X			X	X			X	
Boss et al. (2015)	X			X		X			X
Boss et al. (2009)	X		X		X				X
Brady (2010)	X			X	X				X
Bulgurcu et al. (2010)	X			X	X				X
Burns et al. (2018)	X			X	X				X
Chan et al. (2005)	X		X		X				
Chen et al. (2016)	X			X	X				X
Cheng et al. (2013)		X		X		X	X		
Cheng et al. (2014)		X		X		X	X		
*Chu et al. (2015)		X	X	X	X				
D'Arcy (2005)		X		X		X			X
D'Arcy and Greene (2014)	X			X	X				X
D'Arcy et al. (2014)		X		X		X			X
D'Arcy et al. (2018)		X		X		X			X
D'Arcy and Lowry (2019)	X		X		X				X
*Devgan (2012)	X		X	X	X		X		
Dinev and Hu (2007)	X			X		X			X
Dinev et al. (2009)	X			X		X	X		
Donalds (2015)	X		X		X				
Dugo (2007)		X		X	X				X
Foth et al. (2012)	X			X	X			X	
Goo et al. (2014)	X			X	X		X		
Guo and Yuan (2012)		X		X		X			X
Guo et al. (2011)		X		X		X			X
Haeussinger and Kranz (2013)	X			X	X				
Han et al. (2017)	X			X	X		X		

Table D1. Moderator Details by Paper (Continued)	Moderator #1		Moderator #2*		Moderator #3		Moderator #4**		
Authors (Year)	Policy Compliance	Policy Violation	Actual Compliance	Intended Compliance	General Policy	Specific Policy	Asia-Pacific	Europe	North America
Harrington (1996)		X		X		X			X
Herath and Rao (2009a)	X			X	X				X
Herath and Rao (2009b)	X			X	X				X
Herath et al. (2018)		X		X		X	X		
Hovav and D'Arcy (2012)		X		X		X	X		X
Hovav and Putri (2016)	X			X		X	X		
Hu et al. (2012)	X			X	X				X
Huang et al. (2016)	X			X	X				
Humaidi and Balakrishnan (2018)	X		X		X		X		
Hwang et al. (2017)	X			X	X		X		
Ifinedo (2012)	X			X	X				X
Ifinedo (2014a)	X			X	X				X
Ifinedo (2014b)		X		X	X				X
Ifinedo (2016)	X			X	X				X
Jaafar and Ajis (2013)	X		X		X		X		
Jenkins (2013)	X			X		X			X
*Jenkins and Durcikova (2013)	X		X	X	X				
Jenkins et al. (2010)	X		X		X				
Jeon and Hovav (2015)	X			X	X		X		
Johnston and Warkentin (2010)	X			X		X			
Johnston et al. (2015)	X			X		X		X	
Johnston et al. (2010)	X			X	X				
Kam et al. (2015)	X		X		X		X		X
Kinnunen (2016)	X		X		X			X	
Kranz and Haeussinger (2014)	X			X	X				
Kuo et al. (2017)		X		X	X		X		
Lebek et al. (2014)	X			X	X				
Lee et al. (2016)	X			X	X		X		
Li and Luo (2017)		X		X		X			
Li et al. (2014)	X			X		X			X
Li, Zhang, and Sarathy et al. (2010)	X			X		X			
Li and Cheng (2013)		X		X		X	X		
Liao et al. (2009)		X		X		X			
Lowry et al. (2015)		X	X			X			X
Mani et al. (2015)	X			X		X	X		
Martinez (2015)	X			X	X				X
Moody et al. (2018)		X		X		X		X	
Moquin and Wakefield (2016)	X		X			X			
Ormond et al. (2019)		X		X		X			
*Pahnila et al. (2013)		X	X	X	X			X	
Park et al. (2017)		X		X	X		X		

Table D1. Moderator Details by Paper (Continued)	Moderator #1		Moderator #2*		Moderator #3		Moderator #4**		
Authors (Year)	Policy Compliance	Policy Violation	Actual Compliance	Intended Compliance	General Policy	Specific Policy	Asia-Pacific	Europe	North America
Peace et al. (2003)		X		X		X			X
Posey et al. (2011)		X	X			X			X
Putri and Hovav (2014)	X			X		X	X		
Safa et al. (2016)	X			X	X		X		
Shropshire et al. (2015)	X			X		X			X
Sikolia et al. (2016)	X			X	X				X
*Siponen et al. (2014)	X		X	X	X			X	
Siponen and Vance (2010)		X		X		X		X	
*Sommestad et al. (2015)	X		X	X	X			X	
Son (2011)	X		X			X			X
Son and Park (2016)	X			X		X	X		
Talib and Dhillon (2015)	X			X	X				X
Vance et al. (2012)	X			X	X			X	
Wall et al. (2013)	X			X	X				X
Warkentin et al. (2011)	X			X		X			
Yazdanmehr and Wang (2016)	X			X	X				X
Zhang et al. (2009)	X			X	X				
TOTAL	69	26	19	82	58	37	22	10	42

* Where both actual and intended compliance are measured (i.e., Chu et al. 2015, Devgan 2012, Jenkins and Durcikova 2013, Pahnila et al. 2013, Siponen et al. 2014, Sommestad et al. 2015), our main analysis draws on the actual compliance measurements, since the intended compliance variable is employed as a proxy for actual compliance. However, both actual and intended compliance measurements are included in the analysis for Moderator #1.

**Papers with no Moderator #3 entry either (1) collected data from a location outside of Asia-Pacific, Europe, and North America; (2) no region was specified in the paper; or (3) several regions were drawn upon, but were unable to be separated for analysis.

Appendix E

Preliminary Meta-Analytic Correlation Matrix

Table E1. Preliminary (Non-Trimmed) Meta-Analytic Correlation Matrix																		
Category	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Security Policy Compliance	–																	
2. Attitude	.50 (37)	–																
3. Detection Certainty	.38 (20)	.43 (1)	–															
4. Normative Beliefs	.47 (43)	.40 (26)	.43 (5)	–														
5. Organizational Support	.45 (12)	.30 (2)	.41 (3)	.49 (2)	–													
6. Perceived Benefits	.43 (11)	.51 (2)	-.38 (5)	.31 (2)		–												
7. Perceived Ease of Use	.37 (7)	.40 (4)	.37 (1)	.26 (5)	.25 (1)		–											
8. Perceived Usefulness	.56 (7)	.64 (4)	.38 (1)	.53 (6)			.34 (6)	–										
9. Personal Norms & Ethics	.50 (20)	.28 (2)	.41 (2)	.34 (4)	.20 (1)	-.51 (1)			–									
10. Punishment Expectancy	.30 (29)	.24 (8)	.61 (5)	.40 (8)		.39 (1)			.39 (6)	–								
11. Punishment Severity	.31 (27)	.15 (5)	.49 (11)	.28 (6)	.45 (1)	-.17 (3)			.43 (7)	.59 (19)	–							
12. Resource Vulnerability	.20 (20)	.31 (7)	.51 (2)	.26 (8)		.09 (3)	.05 (1)		.06 (1)	.22 (5)	.18 (4)	–						
13. Response Cost	-.31 (25)	-.22 (5)	-.22 (3)	-.08 (6)	-.05 (3)	-.03 (6)	-.28 (1)		-.03 (1)	-.10 (6)	-.08 (1)	-.07 (8)	–					
14. Response Efficacy	.40 (24)	.42 (5)	.13 (1)	.27 (5)	.40 (1)					.18 (7)	.08 (3)	.15 (14)	-.28 (12)	–				
15. Rewards	.08 (10)	.26 (3)	.28 (1)	.14 (3)		.32 (1)				.15 (4)	.12 (2)	.06 (6)	.44 (4)	-.04 (5)	–			
16. SETA	.39 (30)	.38 (10)	.56 (3)	.39 (9)	.59 (4)	.40 (3)	.26 (3)	.44 (4)	.27 (2)	.38 (5)	.38 (5)	.36 (1)	.00 (6)	.48 (3)	.18 (3)	–		
17. Self-Efficacy	.40 (57)	.36 (24)	.05 (6)	.37 (23)	.48 (6)	.43 (4)	.58 (5)	.35 (4)	.34 (1)	.06 (13)	.01 (8)	.12 (16)	-.28 (16)	.45 (19)	.01 (8)	.38 (15)	–	
18. Threat Severity	.33 (22)	.33 (5)		.28 (5)	.22 (1)		.06 (1)	.15 (1)		.40 (8)	.02 (2)	.40 (16)	-.18 (12)	.38 (20)	-.01 (6)	.22 (1)	.23 (18)	–

Note: The number of studies/independent samples in which the relationship was tested appear in parentheses.

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