

CAMPUS EMERGENCY NOTIFICATION SYSTEMS: AN EXAMINATION OF FACTORS AFFECTING COMPLIANCE WITH ALERTS

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Appendix A

Examples of Recent Campus-Related Incidents

Incident Type	Time	University	Impact
Shooter on campus	April 16, 2007	Virginia Tech, United States	32 people killed; 25 others wounded
	May 23, 2007	C. W. Jefferys Collegiate Institute, Canada	1 student killed
	April 5, 2012	Oikos University, United States	7 people killed
	February 27, 2013	Coastal Carolina University, United States	1 student killed
Robbery	June 2011	University of Kansas, United States	2 students robbed at gunpoint
	November 3, 2011	University of Texas–Austin, United States	4 people robbed at gunpoint
Fire incidents	April 26, 2005	Southern Adventist University, United States	1 student killed
	October 20, 2011	Emporia State University, United States	2 students killed
	June 9, 2013	Darul Uloom School, United Kingdom	Approximately 128 pupils and staff evacuated from school
Extreme weather	August 2005	Tulane University, United States	Closed for 4 months as a result of Hurricane Katrina
	April 2011	University of Alabama, United States	School called off for the rest of the school year due to tornado
	March 11, 2011	Northeastern Japan	7,735 school buildings damaged or destroyed
	February 2011	Queensland, Australia	More than 60 schools across north and far north Queensland affected by Cyclone Yasi closed
Health-related incidents	September 2009	Dayton-area colleges and universities, United States	Area colleges brace for swine flu on campus

Appendix B

Constructs, Measurement Items, and Statistics

Construct	Question	Mean/ St. Dev.	Mean/ St. Dev.	Mean/ St. Dev.	Mean/ St. Dev.	Mean/ St. Dev.
Subjective Norm (Motivation to Comply with the Referent × Normative Belief)						
Motivation to Comply with the Referent	Given the scenario above, I would care what _____ think I should do.					
Motivation to Comply with the Referent 1	my friends	5.11 1.57	4.89 1.87	4.95 1.64	5.40 1.74	4.84 1.80
Motivation to Comply with the Referent 2	my parents	6.05 1.07	5.38 1.69	5.10 1.66	5.94 1.50	5.53 1.63
Motivation to Comply with the Referent 3	university officials	5.69 1.25	5.72 1.42	5.57 1.35	5.54 1.60	5.68 1.43
Motivation to Comply with the Referent 4	my professors	5.39 1.31	5.29 1.70	5.35 1.44	5.48 1.45	5.23 1.60
Motivation to Comply with the Referent 5	other people who are important to me	5.58 1.31	5.29 1.78	5.23 1.58	5.85 1.41	5.46 1.48
Normative Belief	Given the scenario above _____ would want me to comply immediately with the campus alert.					
Normative Belief 1	my friends	5.64 1.25	6.32 0.96	5.88 1.13	5.96 1.15	5.91 1.21
Normative Belief 2	my parents	6.36 1.08	6.58 0.84	6.35 0.95	6.46 0.80	6.45 1.03
Normative Belief 3	university officials	6.36 0.84	6.65 0.72	6.29 1.17	6.32 0.99	6.48 0.91
Normative Belief 4	my professors	6.04 1.12	6.56 0.77	6.30 0.98	6.13 0.97	6.24 0.99
Normative Belief 5	other people who are important to me	6.10 1.10	6.36 .908	6.15 1.10	6.21 0.97	6.16 1.10
Perceived Safety Threat	The scenario above could ...					
Perceived Self Safety Threat 1	have a severe impact on my safety.	5.99 1.15	6.53 0.90	5.97 1.04	5.81 1.27	5.99 1.08
Perceived Self Safety Threat 2	get me hurt or injured.	5.69 1.45	6.40 1.00	5.77 1.27	4.97 1.91	5.85 1.30
Perceived Financial Threat	It is likely to ...					
Perceived Financial Threat 1	have a serious impact on my finances.	4.26 1.68	3.77 1.86	4.52 1.72	4.54 1.72	4.54 1.86
Perceived Financial Threat 2	cause me monetary loss.	4.47 1.69	4.02 1.99	4.64 1.82	4.58 1.76	5.08 1.71

Construct	Question	Mean/ St. Dev.	Mean/ St. Dev.	Mean/ St. Dev.	Mean/ St. Dev.	Mean/ St. Dev.
Information Quality Trust	Given the above scenario, how much would you agree with the following statements regarding campus alerts?					
Information Relevance Trust 1	The alert would be relevant to me.	6.13 1.21	6.26 1.19	6.10 1.28	5.96 1.05	6.05 1.20
Information Relevance Trust 2	The alert would be sent only when necessary.	6.08 1.15	6.16 1.22	6.04 1.01	6.00 1.11	5.89 1.31
Information Relevance Trust 3	The alert would be important for me to make decisions about the situation.	6.14 1.12	6.48 0.81	6.25 0.79	6.29 0.77	6.27 1.02
Information Actionability Trust 1	I can act on the information that I received in the alert.	6.26 1.00	6.53 0.78	6.27 0.88	6.28 0.73	6.34 0.95
Information Actionability Trust 2	If I follow the instructions in the alert, I will be protected.	6.05 1.00	5.67 1.27	6.17 0.96	5.75 1.20	5.44 1.44
Information Actionability Trust 3	The directions in the alert will help me plan my next step.	6.09 0.95	6.26 0.99	6.15 1.03	6.08 0.88	6.12 1.05
Information Criticality Trust 1	The timing of the notification message will be appropriate.	5.71 1.32	6.08 1.14	6.09 1.05	6.04 0.98	6.12 1.14
Information Criticality Trust 2	The messages that I receive will convey the urgency for taking action.	6.01 1.13	6.37 0.92	6.17 0.93	6.10 0.89	6.07 1.11
Information Criticality Trust 3	The messages that I receive will convey the severity of the incident.	5.95 1.16	6.22 1.13	5.99 1.06	6.07 0.85	6.00 1.17
Past Experience	Have you ever experienced any type of incident on campus?					
ENS-Message Compliance Intention	When you receive an emergency notification message asking you to take an action, what are you likely to do first? Please circle only one option for each case below. 1. Comply immediately 2. Verify first and then comply 3. Ignore					

Note: Subjective Norm, Perceived Safety Threat, Perceived Financial Threat, and Information Quality Trust are measured on a seven-point Likert scale. The scales were fully anchored (strongly disagree, disagree, somewhat disagree, neither agree nor disagree, somewhat agree, agree, strongly agree). ENS-Message Compliance Intention includes three categories: intention to comply immediately, intention to verify first and then comply, and intention to ignore.

Appendix C

Focus Group Procedure

Purpose

The purpose of conducting the focus groups was to validate and get a better understanding of the survey results, gain additional insights into the findings from the quantitative study, and provide rich explanations of these results (Venkatesh et al. 2012). The focus groups also helped to elucidate some of the actions that university authorities might take to improve immediate compliance.

Script Creation

Based on the purpose of the focus group and the results from the survey, we created a draft script for the focus group. The final questions used are presented in Table C1.

Table C1. Focus Group Questions	
	In the five types of incidents, when you receive a campus emergency notification message asking you to take certain action,
Subjective norm	... would what you think other people want you to do affect your compliance intention (comply immediately or verify first and then comply)? What do you think other people would want you to do? Whose opinion would you care about? Why?
Perceived safety threat	... does the safety threat influence your compliance intention? How?
Perceived financial threat	... does the financial threat influence your compliance intention? How?
Information quality trust	... does the trust toward the channel and message influence your compliance intention? How?
Practical suggestions	What can the school do to improve your immediate compliance?

Mechanics

Each focus group included two note-takers and a coordinator in addition to six student participants. The answers were recorded by both note-takers using an open coding scheme (Crook and Kumar 1998). The coordinator first introduced the purpose of the study and the focus group, ensuring that participants understood which factors affect ENS-message compliance intention (comply immediately or verify first and then comply) and why these factors are important. Next, the coordinator encouraged all students to actively participate by answering each question. The coordinator guided the direction of the discussion to ensure that the conversation did not digress from the topic and provided necessary explanations. The data from the focus group were entered into a document within 24 hours of each focus-group session.

In addition to the issues discussed in the main body of the paper, the focus groups informed the study on a variety of related issues. For example, we learned from the focus groups that most students prefer to receive notifications for all types of campus incidents. Also, they trust campus police and security personnel more than they trust administrators and professors in this context. For less-urgent incidents, they might seek additional information from other sources such as school websites and news channels, but they felt it remains important for schools to send timely notifications. For example, the students agreed that a snowstorm does not develop as rapidly as a campus shooting incident, but if students are not aware of the changing weather conditions and are driving in a snowstorm, the situation can quickly become dangerous. Hence, timely notifications and compliance remain important in these kinds of incidents. Students also mentioned other factors that might influence compliance—for example, education and training are important to improve immediate compliance; where the campus is located affects the perceived threat posed by robbery incidents; and police on scene, other people receiving the same notification messages, and multiple alerts (such as receiving a text alert and hearing an audible alarm) improve compliance.

References

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Appendix D

Assessment of Common Method Bias

In a data collection process, if all data are self-reported and collected through the same questionnaire within the same period of time, common method bias may affect the estimates of the relationship between constructs. To assess common method bias, we employed two statistical methods: Harman's single-factor test measurement (Podsakoff et al. 2003) and the marker-variable analysis suggested by Lindell and Whitney (2001). We also introduced a procedural remedy to reduce common method bias as suggested by Podsakoff et al. (2003).

First we performed Harman's single-factor test measurement (Podsakoff et al. 2003). We conducted an exploratory factor analysis to determine the number of factors that were necessary to account for the variance in the variables. If a substantial amount of common method variance is present, either (1) a single factor will emerge from the factor analysis or (2) one general factor will account for the majority of the covariance among the variables. We conducted the test for five scenarios. All five analyses produced more than one factor with Eigen values greater than 1.0. The total variance explained by the factors in these five scenarios was 68.74%, 74.63%, 75.15%, 68.97%, and 66.88%, respectively. When using single-factor analysis, if one factor contributes more than 50% of the total variance, common method bias might exist (Indushobha et al. 2010; Nov and Ye 2008; Xu et al. 2014). In our analysis, the first extracted factor accounted for 45.06%, 40.93%, 44.32%, 43.30%, and 44.53% of the variance in the data; the second explained 12.02%, 14.07%, 16.83%, 15.30%, and 13.04% of the variance in the five scenarios. This outcome indicates that common method variance was not a serious issue in our study.

Harman's single-factor test has been criticized for having insufficient sensitivity to detect a moderate or small level of the common bias effect (Malhotra et al. 2006; Podsakoff et al. 2003). For this reason, we also carried out the marker-variable analysis suggested by Lindell and Whitney. "Ease of sign-up for campus alerts" was employed as a theoretically unrelated variable to adjust the correlations among the principal variables. Ease of sign-up for campus alerts was measured by the question, "How much do you agree that signing up for campus alerts is easy to do?" The responses were recorded on a seven-point Likert scale. The scales were fully anchored (strongly disagree, disagree, somewhat disagree, neither agree nor disagree, somewhat agree, agree, strongly agree). This was consistent with the measurement of the other independent variables. The results showed no high correlations between the marker and the principal variables (Table D1). Thus we concluded that common method bias was not a serious concern.

We also introduced a procedural remedy to reduce common method bias, as suggested by Podsakoff et al. (2003). We tried to reduce the variance introduced by social desirability or respondent acquiescence by protecting respondent anonymity and reducing evaluation apprehension. We provided survey participants with verbal and written assurance that the survey would be anonymous and that the purpose of the survey was to help improve campus safety.

The dependent variable of our study was a binary variable—ENS-message compliance intention—which was collected for all five types of events. Because the dependent variable was captured in different contexts, common method bias was not of great concern for the dependent variable in this study.

Table D1. Common Method Bias Analysis (Marker-Variable)

Scenario	Variable	1. Subjective Norm	2. Perceived Financial Threat	3. Perceived Safety Threat	4. Information Quality Trust
Snowstorm	Ease of sign-up for campus alerts	0.12	0.12	0.12	0.12
Active Shooter	Ease of sign-up for campus alerts	0.21*	0.19*	0.02	0.08
Building-Related	Ease of sign-up for campus alerts	0.19	0.12	-0.09	0.24*
Health-Related	Ease of sign-up for campus alerts	0.24	0.05	-0.08	0.26*
Robbery	Ease of sign-up for campus alerts	-0.09	-0.03	0.15	0.13

References

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Appendix E

Sample Campus Emergency Notifications

Snowstorm	Due to severe weather conditions, all day and evening classes and activities at the university are cancelled Thursday, Nov. 20. (University Alert, Nov 2014)
Active shooter	Potentially dangerous situation on campus. Remain in or proceed to a secure location until further notice.
Building-related	An emergency situation has been reported in the building. Please evacuate the building immediately.
Health-related	If you notice any symptoms, please contact your health care provider immediately.
Robbery	A robbery incident was reported in parking lot A at 3 p.m. Please take precautions.