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# Perceptions of the Safety of the Internet: Fear and the Future of the Web

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## ABSTRACT

This paper examines user perception of the risk associated with giving information to online companies, as well as user concerns with personal privacy issues and beliefs that using the Internet can result in personal privacy problems. A proposed research model was created by integrating constructs from previous research, and a survey was conducted to examine one construct from this model, user perception of the Internet or the degree to which individuals discriminate between giving information to online versus traditional companies. Overwhelmingly, respondents report feeling more at risk and less safe when giving information to firms that conduct business only online than when giving information to firms that conduct business only in the traditional face-to-face manner in an office or store. Additionally, nearly two-thirds of those surveyed (sixty-five percent) believe that using the Internet can result in personal privacy problems. Whereas research in this area often points to vendor and/or Web site attributes as dominant factors affecting willingness to give information online, we suggest that positive merchant/Web attributes are necessary but insufficient to provide the assurance of transaction safety that Web users require.

## KEYWORDS

Online trust, information privacy, E-commerce

## INTRODUCTION

The primary motivation of this paper is to add to our understanding of the way in which individuals perceive the trustworthiness of the fundamental technology of the Internet. In their often-cited research on trust in an Internet store, Jarvenpaa and Tractinsky (1999) describe the Internet as an “open, global, heterogeneous and constantly changing marketing channel” such that consumers may be unsure of the hazards and consequences of online shopping. (p. 4). Additionally, in a more provocative assertion derived from marketing literature (Peterson, Balasubramanian and Bronnenberg, 1997) they suggest that “the issue of transaction security [on the Internet] is a short-term technological problem” (Jarvenpaa, Tractinsky and Vitale, 2000, p. 46). While that stream of research neglected the perceived riskiness of the Internet medium and focused instead on the online merchant as the primary target of trust, our study is focused on trust in the Internet medium itself. While individual characteristics of online vendors and stores are certain to affect user trust, we suggest that user concerns about the basic insecurity of the Internet are perhaps more critical to the long-term survival of the Internet as a channel of commerce.

## PREVIOUS RESEARCH

There is no question that many factors influence user willingness to give information in order to buy services or products over the Internet. To explore those factors, we reviewed a small sample of studies that address willingness to complete a transaction on the Internet. From these studies, we extracted a number of variables that were proposed to affect willingness to give personal information or intention to purchase online. These factors include organizational practices relating to the collection and use of private information (Smith, Milberg and Burke, 1996), perceived store size and perceived store reputation (Jarvenpaa and Tractinsky, 1999), Web site features (Belanger, Hiller and Smith, 2002), system trust as engendered by seals, guarantees and ratings (Pennington, Wilcox and Grover, 2003), and Web site social presence and individual trusting disposition (Gefen and Straub, 2004). These antecedents of intention to purchase online include attributes of the individual, attributes of the organization, and attributes of the context of the transaction (i.e., the Web site), but do not consider user trust of the medium – trust in the Internet itself. (See Table 1.)

STUDY	THEORY	ANTECEDENTS	DEPENDENT VARIABLE
Smith, Milberg and Burke (1996)		Organizational Practices (collection, errors, unauthorized secondary use, improper access)	Willingness to give private information
Jarvenpaa, Tractinsky and Vitale (2000)	Exchange theory Balance theory Theories of reasoned action and planned behavior	Trust in Store (perceived size, perceived reputation)	Willingness to buy
Belanger, Hiller and Smith (2002)		Web Features (privacy, security, pleasure) trustworthiness	Purchase Intention Willingness to give private information
Pennington, Wilcox and Grover (2003)		System Trust (seals, guarantees, ratings) Perceived Trust in Vendor (perceived vendor reputation) Attitude Toward Vendor	Purchase Intention
Malhotra, Kim and Agarwal (2004)	Social contract theory Trust-risk framework Theory of reasoned action	IUIPC: Internet Users' Information Privacy Concerns (collection, control, awareness) Trusting Beliefs Risk Beliefs	Behavioral Intention [to release personal information]
Gefen and Straub (2004)	Social presence theory	Social Presence Trusting Disposition Familiarity with Web site E-Trust (Integrity, Predictability, Ability, Benevolence)	Purchase Intentions

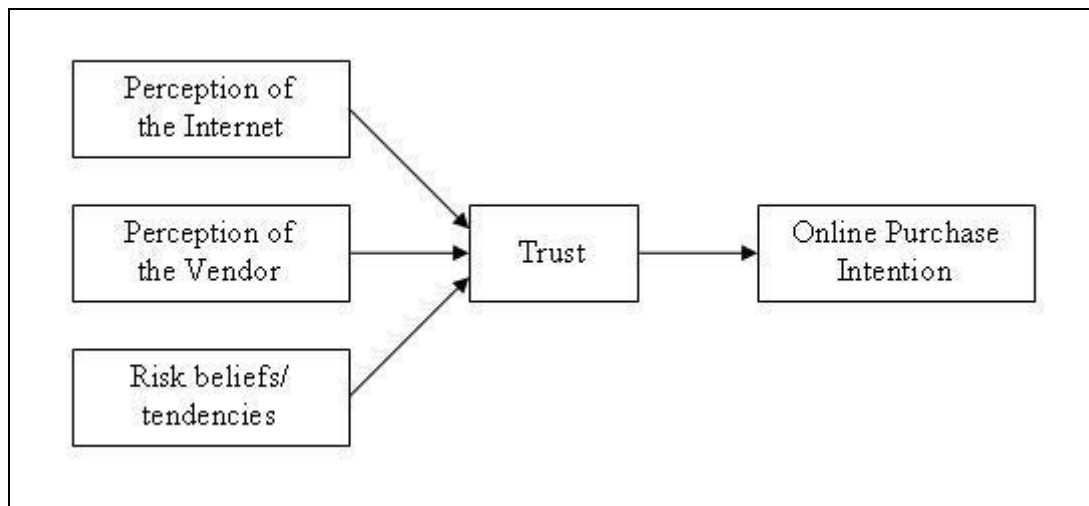
**Table 1. Previous Conceptualizations**

In addition to research that explored individual, organizational, and Web site characteristics as determinants of online purchase intention, we also searched out studies that included trustworthiness of the Internet medium as a factor affecting Internet behaviors. Lee and Turban (2001) propose a model for consumer trust in Internet shopping that includes (among others) a construct of trust in the computerized medium based on perceived technical competence, perceived system performance, and user understanding of the system/medium. Additionally, this model includes individual trust propensity as a mediating factor. In another model of e-Commerce relationship trust, McKnight and Chervany (2001) include the structural assurance subconstruct of institution-based trust as a factor ultimately affecting trust-related Internet behaviors. In this research, structural assurance is characterized as “technological Internet safeguards” such as encryption (McKnight and Chervany, 2001, p. 5).

### **A RESEARCH MODEL AND HYPOTHESIS**

The focus of this paper is limited to one specific determinant of trust in the online environment (i.e., perception of the Internet). This construct is only one component of a proposed research model, shown in Figure 2, that is a synthesis of constructs from previous research such that common themes of trust in the Internet store (Jarvenpaa and Tractinsky, 1999;

Jarvenpaa et al., 2000), trust in the vendor (Pennington et al., 2003), trust in organizational practices (Smith et al., 1996), and Web features (Belanger et al., 2002; Gefen and Straub, 2004; Pennington et al., 2003) are combined as one factor: perception of the vendor. Common themes of user trust disposition such as risk beliefs (Malhotra et al., 2004), user attitude and risk perception (Jarvenpaa et al., 2000), and individual trusting disposition (Gefen and Straub, 2004), are combined in one factor: risk beliefs/tendencies. The construct of interest in this paper, perception of the Internet, incorporates the aspects of user trust of the computerized medium (Lee and Turban, 2001) and user beliefs in Internet safeguards (McKnight and Chervany, 2001). As such, perception of the Internet is characterized as trust in the general Internet environment, that is, trust in the medium that is independent of online vendor characteristics.



**Figure 1. Proposed Research Model**

While the proposed research model suggests a relationship between perception of the Internet, perception of the vendor, individual risk beliefs/tendencies, and trust that leads to online purchase intention, this exploratory research addresses only one determinant of trust (perception of the Internet) that leads trust. Based on the literature, we used the following null hypothesis to test the concern that users have about the basic insecurity of the Internet:

H1: Individuals display no difference in attitude between giving information to companies that do business only online and giving information to companies that do business only in the traditional face-to-face manner in an office or store.

## STUDY DESIGN

A survey was used to collect data from students enrolled in an undergraduate MIS course required for all undergraduate business students regardless of major. To motivate a high rate of participation, students received course credit for completing the survey. To assure standardized survey administration, a script was read to each group of students to advise them of the purpose of the study and encourage them to answer the questions based on their knowledge and actual behavior. (See Appendix A.) One researcher administered surveys in all 18 sections of this course during a ten-day period, and received completed responses from 271 students. Table 2 lists descriptive statistics about the sample.

The perception of risk scale was adapted from the literature on information privacy concerns. Specifically, the scales were created by selecting and adapting items that dealt with Internet risk beliefs from Malhotra et al. (2004) and Smith et al. (1996). The survey was designed to measure directly the perception of giving information to firms and the selection of items is such that it reasonably represents a distinction between two types of firms and exhibits internal consistency among items. Thus we claim circumstantial evidence of content validity that permits generalizability of results. Additionally, survey items were worded in both directions in order to minimize response bias. Moreover, the instrument exhibits modest reliability as evidenced by a .70 standardized alpha coefficient.

All items were statements, and responses were on a five-point scale ranging from Strongly Agree (1) to Strongly Disagree (5). We created two versions of the questionnaire incorporating the word "personal" as the sole variation. (See Appendix A.) Questions in treatment one referred to "giving information to companies" while questions in treatment two referred to

“giving personal information to companies.” The two survey treatments were commingled in order to achieve randomized selection during survey administration.

	NUMBER	PERCENTAGE
Gender		
Male	127	46.7
Female	133	48.9
Chose not to disclose	12	4.4
		100.0
Age group		
18-24	200	73.5
25-34	44	16.2
35-44	18	6.6
>45	7	2.6
Chose not to disclose	3	1.1
		100.0
Ethnic Group		
Native Hispanic/Latino	6	2.2
Asian	8	2.9
Black/African American	91	33.5
White	154	56.6
Other	4	1.5
Chose not to disclose	9	3.3
		100.0

**Table 2. Characteristics of Respondents**

## RESULTS

A five-point Likert scale was used to measure the magnitude of each question such that a mean score of 1 represents a strong positive response while a mean score of 5 represents a strong negative response. Scores for items 5 and 10 were reverse coded since these statements were phrased in the opposite direction from other statements. Analysis of variance indicates no statistically significant difference in overall scores between survey treatment one (give information, N=150) and survey treatment two (give personal information, N=121). (See Table 3.) However, inconsistencies in differences in means within and across groups were seen and are discussed later in the paper.

ITEM	TREATMENT GROUP 1 (N=150)		TREATMENT GROUP 2 (N=121)		COMBINED (N=271)	
	MEAN	STD.DEV.	MEAN	STD.DEV.	MEAN	STD.DEV.
1	2.19	.995	2.22	1.029	2.21	1.008
2	2.51	1.067	2.29	.953	2.41	1.021
3	2.22	1.042	2.15	1.046	2.19	1.042
4	2.69	1.068	2.64	.999	2.67	1.036
5	2.61	1.070	2.60	1.100	2.60	1.081
6	3.73	1.092	3.60	.953	3.67	1.032
7	3.73	1.034	3.69	.922	3.71	.984
8	3.84	.990	3.82	.827	3.83	.919
9	3.63	.938	3.70	.863	3.66	.904
10	3.72	1.056	3.61	1.098	3.67	1.075
11	3.57	1.223	3.63	1.259	3.59	1.237
12	2.14	1.105	2.22	1.004	2.18	1.060

Table 3. Summary Statistics (Within and Across Groups)

*Perception of the Difference between Online and Traditional Environments*

Survey items one through five reflect attitude toward online business and items six through ten reflect attitude toward traditional business. Item one was paired with item six (Pair 1), item two was paired with item seven (Pair 2) and so on, until we have five paired items to measure the difference in attitude between online and traditional firms. Paired comparison t-tests were conducted within and across the two treatment groups. (See Table 4.)

	TREATMENT GROUP ONE (N=150)			TREATMENT GROUP TWO (N=121)			COMBINED (N=271)		
	T-VALUE	DF	P-LEVEL	T-VALUE	DF	P-LEVEL	T-VALUE	DF	P-LEVEL
Pair 1	14.635	149	<.001	10.550	120	<.001	17.803	270	<.001
Pair 2	10.915	149	<.001	12.243	120	<.001	16.198	270	<.001
Pair 3	14.388	149	<.001	13.989	120	<.001	20.060	270	<.001
Pair 4	8.982	149	<.001	9.000	120	<.001	12.710	270	<.001
Pair 5	9.441	148	<.001	7.243	120	<.001	11.839	269	<.001

Table 4. Paired Comparisons (Within and Across Groups)

The statistically significant differences in means for all five pairs of items (within and across groups) fail to support the null hypothesis and so provide evidence that individuals discriminate between giving information to companies that do business only online and companies that do business only in a traditional face-to-face manner in an office or store, perceiving the online environment to be higher risk than the traditional environment. The analysis of the perceived differences between only online and only traditional business that considers all responses as one group is shown in Figure 2.

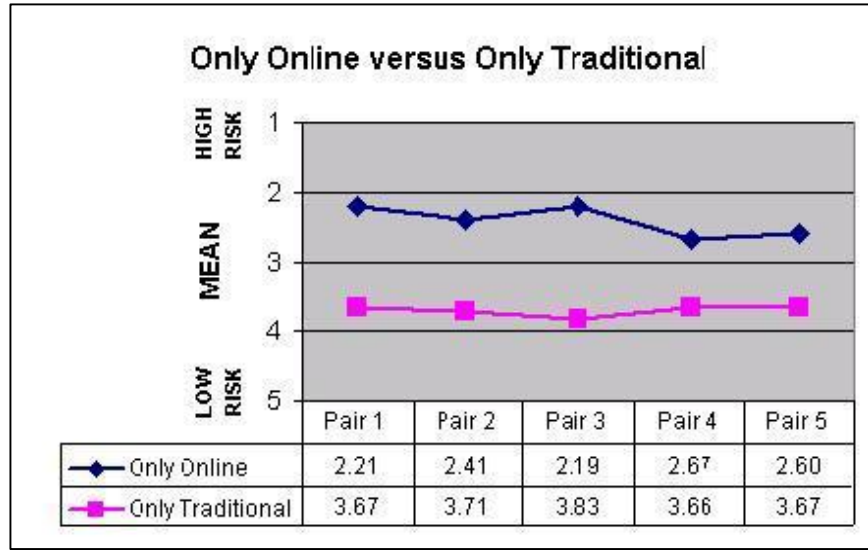


Figure 2. Difference in Risk Perception of Online and Traditional Firms

Overwhelmingly, respondents report feeling more at risk and less safe when giving information to only online firms than when giving information to only traditional firms. (See Figure 2.)

*Perception of the Online Environment*

We also observed differences in attitude toward the online environment between demographic groups. Analysis of means within and across treatment groups by gender indicates females generally perceive the Internet to be more risky than males. (See Table 5.) Results from treatment group one (give information) show females consistently providing lower scores on items one through five thus rating the Internet more risky than do males, although results from treatment group two (give personal information) show females providing lower scores on four out of five measures. However, results across both groups show females providing lower scores on all five items, similar to results in treatment group one.

ITEM	MEAN TREATMENT GROUP 1 (N=150)		MEAN TREATMENT GROUP 2 (N=121)		MEAN COMBINED (N=271)	
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
1	2.36	2.03	2.40	2.07	2.38	2.05
2	2.64	2.36	2.31	2.34	2.50	2.35
3	2.32	2.13	2.49	1.89	2.39	2.02
4	2.82	2.57	2.82	2.52	2.82	2.55
5	2.78	2.42	2.82	2.41	2.80	2.41

Table 5. Perception of Online Environment by Gender (Within and Across Groups)

While Table 5 shows a mostly regular pattern of differences in mean by gender, analysis of variance reveals an irregular pattern of statistically significant differences in means within and across treatment groups by gender. For example, in treatment group one, means on items 1 and 5 are statistically different between males and females, but in treatment group two, means on items 3 and 5 are statistically different. However, analysis of the combined group reveals means on items 1, 3, 4, and 5 are statistically different. (See Table 6.)

ITEM	TREATMENT GROUP ONE (N=150)			TREATMENT GROUP TWO (N=121)			COMBINED (N=271)		
	F-VALUE	DF	P-VALUE	F-VALUE	DF	P-VALUE	F-VALUE	DF	P-VALUE
1	4.099	(1,142)	.045	3.325	(1,114)	.071	7.40	(1,258)	.007
2	2.417	(1,142)	.122	.040	(1,114)	.841	1.273	(1,258)	.260
3	1.259	(1,142)	.264	10.432	(1,114)	.002	8.826	(1,258)	.003
4	1.945	(1,142)	.165	2.598	(1,114)	.110	4.464	(1,258)	.036
5	4.116	(1,142)	.044	4.074	(1,114)	.046	8.826	(1,258)	.004

Table 6. Analysis of Variance of Online Environment by Gender (Within and Across Groups)

While gender differences exist across various measures of the perception of risk of the Internet, the results of the analyses are consistent across only one measure (item 5) to offer evidence that females report feeling less safe giving information to online firms than do males.

In addition to differences in attitude toward the online environment by gender, the data also reveal significant differences in means on several measures between ethnic groups, although results are irregular within treatment groups, and the differences in scores are not large (<.5 on average). Specifically, subjects in treatment group one (give information) provided scores on four items (1, 2, 3, and 4) that are statistically different between the black/African American subjects and white subjects; however, none of the scores from treatment group two (give personal information) are statistically different by ethnic group. Analysis of the combined treatment groups reveals scores that are statistically different on three measures (2, 3, and 4). The analysis of the perceived difference of the online environment between black/African American subjects and white subjects that considers all responses as one group is shown in Figure 3.

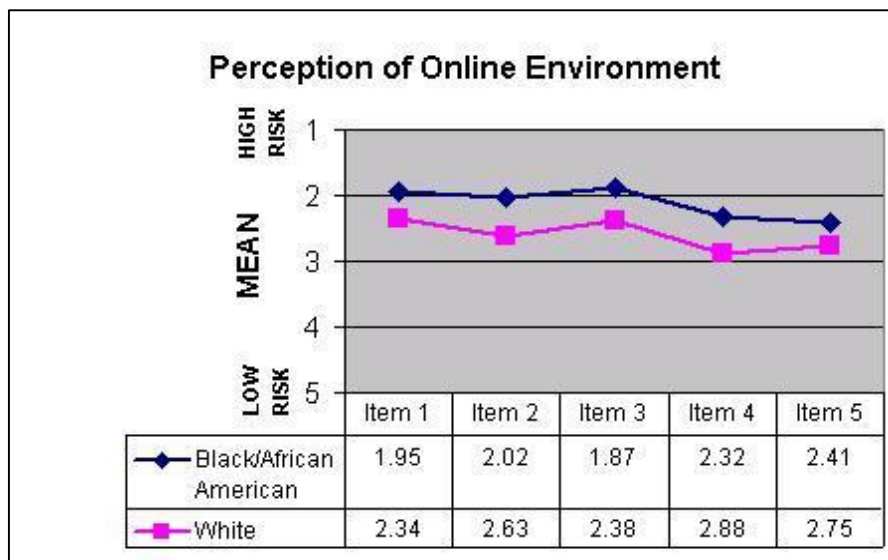


Figure 3. Difference in Perception of Online Environment

In particular, the differences in means for item 2 (high potential for loss giving information to only online),  $F(4,258) = 6.07$ ,  $p < .05$ , item 3 (too much uncertainty giving information to only online),  $F(4,258) = 3.822$ ,  $p < .05$ , and item 4 (providing information to only online would involve unexpected problems),  $F(4,258) = 4.865$ ,  $p < .05$ , provide evidence that



black/African American individuals hold less favorable attitudes toward online business than do white individuals. (See Table 7.)

ITEM	MEAN TREATMENT GROUP 1 (N=150)		MEAN TREATMENT GROUP 2 (N=121)		MEAN COMBINED (N=271)	
	BLACK/ AFRICAN AMERICAN	WHITE	BLACK/ AFRICAN AMERICAN	WHITE	BLACK/ AFRICAN AMERICAN	WHITE
11	3.75	3.48	4.11	3.40	3.93	3.45

**Table 7. Differences in Perception of Online Environment by Ethnic Group**

#### *Concern with Personal Privacy Issues*

In addition to showing a difference in risk perception between online and traditional channels, the data confirm that individuals are moderately concerned with privacy issues. In response to the statement, "I believe other people are too much concerned with [personal] privacy issues" (item 11), subjects within and across groups provided more negative responses (mean = 3.57, 3.59, 3.63) indicating disagreement with the statement. (See Table 2.) While these means are not particularly strong, it is notable that more than half of the respondents (about 56 percent) disagree with this statement, while 23 percent indicate no opinion and 21 percent report agreement. (See Table 7.)

RESPONSE	FREQUENCY	PERCENT	CUMULATIVE PERCENT
5 (Strongly Disagree)	84	31.0	31.0
4	67	24.7	55.7
3	62	22.9	78.6
2	42	15.5	94.1
1 (Strongly Agree)	16	5.9	100.0

**Table 7. Frequencies (Believe others are too concerned with privacy issues)**

In two comparisons, post hoc tests report a significant difference between ethnic groups such that black/African American subjects reported more concern with privacy issues than did white subjects. The difference in scores within group one (give information) was not statistically different. However, the differences in scores within group two ( $F(4,114) = 4.225, p < .05$ ) and across both groups ( $F(4,258) = 3.705, p < .05$ ) suggest that black/African American subjects perhaps are more apprehensive or more anxious about personal privacy issues.

#### *The Internet and Privacy Problems*

When asked if using the Internet can result in [personal] privacy problems (item 12), subjects provided a more positive response (mean = 2.14, 2.18, 2.22) (See Table 2) indicating moderate agreement with the question, and corroborating the ratings in Figure 2 that show a higher perception of risk for the online environment. Nearly two-thirds of the respondents (65 percent) agree that using the Internet can result in privacy problems, while 24 percent offer no opinion and only 11 percent disagree.

RESPONSE	FREQUENCY	PERCENT	CUMULATIVE PERCENT
1 (Strongly Agree)	84	31.0	31.0
2	93	34.3	65.3
3	66	24.4	89.7
4	18	6.6	96.3
5 (Strongly Disagree)	10	3.7	100.0

**Table 8. Frequencies (Using the Internet can result in privacy problems)**

## DISCUSSION AND CONCLUSIONS

Contrary to Peterson et al. (1997) and Jarvenpaa et al. (2000), we continue to see evidence that transaction security is not a short-term problem but rather remains a major obstacle for many Internet users. Inundated with a steady stream of headlines about identity theft, security breaches, software flaws, and Internet scams, many Web users are rethinking their online behavior in light of ongoing online security problems. Indeed, a recent study by *Consumer Reports WebWatch* says fear of security problems is causing users to spend less time on the Internet, stop giving personal information, and stop buying things online altogether (Leap of Faith, 2005). While Jarvenpaa et al. (2000) provide strong evidence that perceived size and perceived reputation of an online merchant increase trust which leads to consumer willingness to buy, it is apparent that positive merchant attributes are necessary but insufficient to provide the assurance of transaction safety that Web users require. One particular merchant attribute that is customarily linked to trust in the Internet is the information privacy policy. While Earp, Antón, Aiman-Smith, and Stufflebeam (2005) suggest that organizations should proactively manage privacy policy content in order to foster consumer trust, other research (Meinert, Peterson, Criswell and Crossland, 2006) offers evidence that fewer than fifty percent of Internet shoppers read privacy statements. Despite the wide-spread use of Web site privacy policies that signal trustworthy organizational practices, our research confirms that individuals believe that using the Internet can result in personal privacy problems.

The research presented here, while limited to measuring the difference in attitude between giving information to firms that do business only online and firms that do business only in a traditional face-to-face manner, suggests that negative perception of the Internet may obviate positive merchant attributes (such as brand equity) and Web site artifacts (such as privacy policies and symbols of institutional trust) such that reputation and site design may be insufficient and/or ineffectual in developing online trust. One implication for organizations is that an increase in the number of signals of trust or an increase in the perceived quality of signals of trust may be necessary to persuade potential consumers to have confidence in the online environment.

A limitation of this study is that we did not directly measure behavior but instead utilized a self-report assessment of risk perception. Additionally, we used a sample of convenience and the student subjects received course credit for participation, and so our results may not generalize to other populations or settings. Future research could possibly investigate the degree to which vendor and/or Web site attributes mitigate the risk inherent to the online medium. For example, vendor and Web site attributes could be manipulated to test the levels of each or combinations of attributes that are effective in overcoming the resistance to transact online so that risk averse Internet users become willing to give information.

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**APPENDIX A****Script for Survey Administrator**

I am here to ask you to participate in a survey that we are conducting to learn more about attitudes and behaviors related to giving information to companies. Participation is voluntary; however, you will receive one percent extra credit on your final grade if you choose to participate in this study.

The answers you give are very important and so we ask that you read each question carefully and answer it based on what you really know or what you really do. This is not a test and there are no right or wrong answers. You will not be timed.

This survey is anonymous and confidential. Your name will not be placed on this survey, and none of the information you give is personally identifiable. This means that no one will ever be able to connect you with your answers. The questions that ask about your background will be used only to describe the types of students completing this survey.

Please answer the 12 questions on the front of the questionnaire first and then turn the form over to the back side and answer the questions relating to your background. Are there any questions?

**APPENDIX B**

It is risky to give [personal] information to companies that do business only online.
There is a high potential for loss associated with giving [personal] information to companies that do business only online.
There is too much uncertainty associated with giving [personal] information to companies that do business only online.
Providing [personal] information to companies that do business only online would involve unexpected problems.
I feel safe giving [personal] information to companies that do business only online.
It is risky to give [personal] information to companies that do business only in the traditional face-to-face manner in an office or store.
There is a high potential for loss associated with giving [personal] information to companies that do business only in the traditional face-to-face manner in an office or store.
There is too much uncertainty associated with giving [personal] information to companies that do business only in the traditional face-to-face manner in an office or store.
Providing [personal] information to companies that do business only in the traditional face-to-face manner in an office or store would involve unexpected problems.
I feel safe giving [personal] information to companies that do business only in the traditional face-to-face manner in an office or store.
I believe other people are too much concerned with privacy issues.
Using the Internet can result in privacy problems.