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## Website design features and intended use: the mediating roles of affective trust and risk

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### Abstract

While cognitive trust and cognitive risk have become established determinants of behavioral intentions in e-commerce, affective trust and affective risk have been largely overlooked. The present research differentiates affective trust and affective risk from their cognitive counterparts and finds that both affective trust and affective risk were significant mediators of website design features. These findings imply that cognitive conceptualizations of e-commerce trust and risk provide an incomplete account of the mechanisms by which website design features may influence intentions, and that affective trust and risk provide additional insight and explanatory power.

**Keywords:** affective trust, affective risk, feelings, experiment, B2C e-commerce

### Introduction

Information Systems (IS) researchers have empirically examined the positive influence of cognitive trust and the negative influence of cognitive risk on consumers' behavioral intentions in business-to-consumer (B2C) e-commerce (Fortes and Rita, 2016; Glover and Benbasat, 2011; Yang, Chen and Wei, 2015). Although cognitive trust and cognitive risk have become established in the literature as key determinants of e-commerce intentions and mediators of design features, affective trust and affective risk have been largely overlooked. The exclusion of affective trust and affective risk leaves the examination of the interaction between consumers and a web vendor's online storefront incomplete, which could hinder further understanding of consumer cyber behavior, and subsequently diminish efforts to promote the growth of e-commerce. Therefore, it is necessary to examine the nature of these constructs and their influence on behavioral intentions, which are vague and elusive in current research.

Furthermore, we need a deeper understanding of the interplay between a person's psychological processes and website design technologies (Gefen 2002). There is a specific call to "examine the dimensionality of trust and perhaps reconsider the construct of trust in the context of online environments" (Gefen, Benbasat, and Pavlou 2008, p. 276). There is also a call to IS researchers to redirect focus toward IT artifact design and evaluation (Benbasat and Barki 2007). Hevner, March, Park, and Ram (2004) make the case that acquiring knowledge that furthers the productive application of information technology requires two complementary but distinct paradigms – namely, behavioral science and design science. The current research heeds these calls, in reexamining the trust construct (as well as the risk construct) in order to extend our understanding of the psychological mechanisms by which e-commerce design features may impact intended use.

The rest of this paper is organized as follows: in the next section this research builds a theoretical framework for affective trust and affective risk, primarily drawing on need to belong theory (Baumeister and Leary 1995) and risk as feelings theory (Loewenstein et al. 2001). The hypotheses will be formulated based on

the theoretical framework. Next, this research describes and presents the results of an experiment study. Finally, the conclusions and implications of the research will be presented.

## Literature Review

This research focuses on two specific instances of affect, namely affective trust and affective risk. Affective trust consists of people's feelings of belonging in a relationship. Affective risk is about a person's feelings of worry or fear in an uncertain environment. The feelings of belonging could have positive influence on behavioral intentions, while feelings of worry or fear may have negative influence on behavioral intentions. The theoretical foundations and the definitions of the constructs are presented in turn in the following paragraphs.

Affective trust is defined as a truster's anticipatory emotional feelings of bond or attachment between the truster and a trustee. In B2C e-commerce, customers are the trusters and the web vendors are the trustees. This definition follows the tradition of defining affective trust as an emotional bond (McAllister 1995, Johnson-George and Swap 1982, Lewis and Weigert 1985), and specifically, is built on the need to- belong theory (Baumeister and Leary 1995). The "need-to-belong" perspective (Baumeister & Leary 1995) asserts that the need to form and maintain strong, stable interpersonal relationships is a fundamental human motivation. Baumeister and Leary (1995) review and integrate a broad base of literature to underscore the pervasiveness of these human affiliative tendencies.

This conceptualization of affective trust emphasizes the emotional content surrounding these relational bonds. Baumeister and Leary emphasize the "tendency to experience affective distress when deprived of social contact or relationships, and a tendency to feel pleasure or positive affect from social contact and relatedness" (p. 499) and further explain that "The main emotional implication of the belongingness hypothesis is that real, potential, or imagined changes in one's belongingness status will produce emotional responses, with positive affect linked to increases in belongingness and negative affect linked to decreases in it" (p. 505). Because these affiliative bonds are known to form not just between individuals but also between an individual and a group, such as a religious group, or between an individual and institutions such as work organizations, this research theorizes that they can and do form between individual consumers and web vendors. Moreover, this research theorizes that the emotional nature of affective trust implies that it functions distinctly from cognitive trust, having effects on behavioral intentions over and above cognitive trust and differentially mediating the effect of certain web vendor design characteristics.

Affective risk is defined as a person's anticipatory negative feelings, such as worry, fear or anxiety about loss, vulnerability or threat in an uncertain environment. Loewenstein et al.'s (2001) risk-as-feeling theory examined the influence of negative feelings in an uncertain or risky environment on behavioral responses. They found that people may experience these feelings when they face difficult choices which could have serious consequences in an uncertain or risky environment. These feelings could overwhelmingly direct people to a choice or course of action different from the one which would be otherwise selected based on their cognitive and rational evaluations of the situation. Consumers believe that it is risky to purchase online, especially from unknown web vendors, because of their unfamiliarity with the legitimacy, privacy and security of the unknown web vendor (Torkzadeh and Dhillon 2002). Subsequently, people may experience negative feelings about their potential purchases, and these negative gut feelings may prompt them not to react in the way the web vendor intended, such as either abandoning their shopping cart or browsing a competitor's website for more information.

This research follows the SOR (stimuli-organism-response) framework, which implies a person's behavioral response is the direct result of the internal organism triggered by a set of stimuli. Affective trust and affective risk feelings could be triggered by a set of external stimuli and may have additional significant

power in explaining the variance of people's behavioral intentions besides cognitive trust and cognitive risk beliefs. Particularly, in B2C ecommerce, the influence of webpage design features could play a critical role on the impact of a customer's behavioral intentions could be fully mediated by the customer's affect and cognitive responses triggered by the design features.

The focus of this research is not on whether design features could influence customers' cognitive perceptions, specifically, cognitive trust and cognitive risk. There is already ample existing supporting empirical evidence of this influence. For example, Cassell and Bickmore (2000) showed that a conversation agent, a design feature which can mimic human interaction rituals such as greetings, gestures, and small talk, could induce cognitive trust through trust-inspiring mechanisms. During a conversation, this conversation agent could show its benevolence toward its conversation partner by greetings, emphasizing past benevolent experience, and its credibility through its association with the third parties, smooth speeches, and domain expertise. Additionally, researchers experimentally demonstrated that a store's perceived size and customer feedback were effective in influencing cognitive trust (Ba and Pavlou, 2002; Grazioli and Jarvenpaa, 2000; Jarvenpaa, Tractinsky and Vitale, 2000). There was also evidence that web site designers can effectively use assurance mechanisms, which include features like third party endorsements, store locations, news clips, warranties, etc., to reduce customers' cognitive risk beliefs (Grazioli and Jarvenpaa, 2000). Furthermore, matching people's photos to a website's design and brand can significantly increase customers' trust toward an online store (Riegelsberger, Sasse and McCarthy, 2003). Significant progress has been made on how to make computers more persuasive and credible (Fogg, 2002; Fogg, et al., 2001); however, what is lacking in the current literature is how website design features could influence affective trust and affective risk feelings, respectively.

Much IS ecommerce research relies on survey data based on consumers' salient perceptions to evaluate the effectiveness of the website design features. Although this approach is effective in terms of revealing the psychological process of how website design features influence people's behavioral dispositions, it does not provide direct evidence of which design feature or bundle of design features would make the difference. As a result, practitioners, managers, and website designers, etc., are usually left with vague and less actionable suggestions, which would limit the contributions of these studies. This research specifically links web site design features with these emotional feelings. The confirmation of this linkage would provide better design guidance to website practitioners.

Based on need to belong theory (Baumeister and Leary 1995) and risk as feelings theory (Loewenstein et al. 2001), affective trust (the customers anticipatory emotional feelings of bond or attachment with a web vendor) and affective risk (anticipatory negative feelings, such as worry, fear or anxiety about loss, vulnerability or threat in an uncertain environment) may be expected to influence the behavioral intent to use an ecommerce website. These affective influences are not a result of cognitive processes. These affective psychological mechanisms may be the means by which design features influence the intention to use an e-commerce site, and therefore we hypothesize that affective trust and affective risk will mediate between trust building/risk mitigating design features and behavioral intent:

### **Hypothesis 1a:**

*Website design features could elicit affective trust feelings in B2C e-commerce.*

### **Hypothesis 1b:**

*Affective trust will have a significant impact on the intentions to use an e-commerce site.*

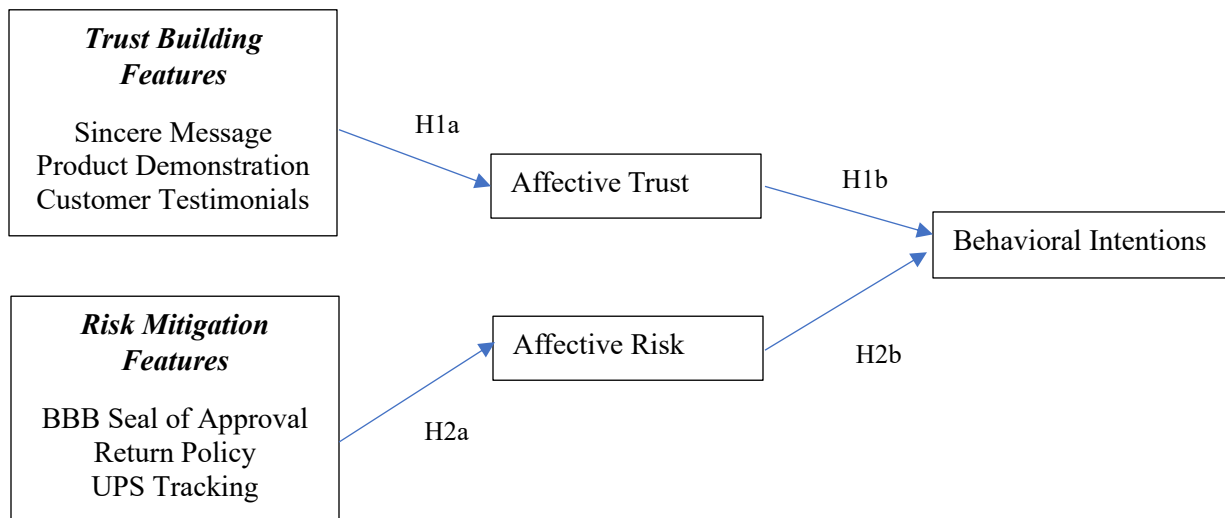
## Hypothesis 2a:

*Website design features could reduce affective risk feelings in B2C e-commerce.*

## Hypothesis 2b:

*Affective risk will mediate between risk mitigating ecommerce design features and intended use of an e-commerce site.*

These hypotheses are captured by the research model in Figure 1.



**Figure 1: Research Model**

## Experiment Design

This study used a 2x2 between-subject experiment design. The two orthogonal manipulations employed a group of ecommerce design features that were hypothesized to build trust, and a group of ecommerce design features hypothesized to mitigate risk. The 2x2 treatment groups were labeled affective trust (high/low) and affective risk (high/low). Experiment participants are randomly assigned to only one specific task, differentiated from other tasks by experimental design. By using a between subject design, this research is able to guard against carry-over effects. Furthermore, there is less of a mental workload for participants than with a within subject design. The risk mitigating and trust building design features include sincere message, reputation and product demonstration to manipulate affective trust, and UPS tracking, return policy and BBB seal to manipulate affective risk. The selection of these design features was based on interviews with real customers, discussions with domain experts, and reviews of existing literature.

An experimental online store selling digital cameras was set up for the experiment. The experiment task is to shop for a digital camera. Four separate versions of the store were created for different conditions of manipulations. The first treatment condition includes all three design features intended to influence affective trust, but none of the design features intended for affective risk. The second treatment condition has none of the design feature manipulations. The third treatment condition includes all of the design features intended to influence affective trust and affective risk. The fourth treatment condition has three

design features intended to influence affective risk, but none of the design features intended for affective trust.

Experiment participants were undergraduate students ( $n=203$ ). On arriving at the lab, they were assigned to one of the four design conditions randomly and received a packet which contained the experiment task description. The navigation structures were the same for all four experiment websites. Participants could complete the task at their own pace, and upon completion, were asked to complete an online questionnaire about their trust and risk feelings and concerns, along with their behavioral dispositions. The experiment took about 30 minutes to complete, including the time to answer the survey questions.

## Results

Figure 2 shows the influence of trust building design features on affective trust, and the effect of affective trust on behavioral intentions. The evidence for Hypothesis 1a was significant: A t-test for a difference in means revealed that the trust building design features had a significant impact on affective trust ( $t=2.072$ ,  $p<.05$ ). A regression analysis revealed that affective trust significantly impacted intended use ( $\beta=.331$ ,  $p<.01$ ). Therefore, hypothesis 1b was supported too. A Sobel test for mediation was marginally significant ( $z=1.85$ ,  $p=.064$ ). The reason might be that the trust building design features also influence cognitive trust and therefore the test is compromised, as behavior is also influenced by cognitive trust and this variance is not accounted for in our analysis.



**Figure 2: Mediating Role of Affective Trust**

Figure 3 shows the influence of risk mitigating design features on affective risk, and the effect of affective risk on intended use. A t-test for a difference in means revealed that the risk mitigating design features had a significant impact on affective trust ( $t=2.781$ ,  $p<.01$ ). A regression analysis revealed that affective risk significantly impacted intended use ( $\beta=-.528$ ,  $p<.01$ ). Both hypothesis 2a and 2b were supported. A Sobel test for mediation was significant ( $z=2.60$ ,  $p<.01$ ). Thus, the incorporation of sincere messages, product demonstrations and positive customer testimonials into website design significantly increased the likelihood of developing an emotional bond between a customer and a web vendor. A better worded return policy, the usage of the BBB seal, and a package tracking function would significantly reduce potential anticipatory negative feelings toward the web vendor.



**Figure 3: Mediating Role of Affective Risk**

To further examine the convergent, discriminant and predictive validities of affective trust and affective risk constructs, the impact of these two constructs on behavioral intentions were tested using a structural equation model together with cognitive trust and cognitive risk. The instruments for these constructs were adopted from existing instruments (Sha, 2017 and 2018) (7-point scales). Table 1 shows that the AVE for each construct exceeds 0.5 establishing convergent validity. The square root of the AVE for each construct exceeds the cross correlations except for cognitive risk.

**Table 1: Descriptive Statistics and Correlations**

	Variable	Mean	Std Dev	Composite Alpha	1	2	3	4	5
1	Affective Trust	2.79	1.23	0.86	<b>0.77</b>				
2	Affective Risk	3.15	1.14	0.92	-0.12	<b>0.85</b>			
3	Cognitive Trust	4.67	1.10	0.91	0.51	-0.60	<b>0.85</b>		
4	Cognitive Risk	3.63	1.07	0.76	0.42	0.70	-0.78	<b>0.69</b>	
5	Intended Use	4.16	1.23	0.67	0.35	-0.72	0.62	-0.56	<b>0.72</b>

The estimates assessing the predictive validities of the four trust/risk constructs with consumer behavioral intentions are shown in Table 2. The value of RMSEA is 0.097 is lower than the recommended threshold of .1. The values for GFI, AGFI, CFI and CFI indicate the model has overall adequate fit. The joint influence of affective trust, affective risk, cognitive trust, and cognitive risk explained 60% of the variance of behavioral intentions.

Affective trust and affective risk were significant in influencing behavioral intentions when controlling for cognitive trust and cognitive risk. Cognitive trust was significant but cognitive risk was not significant when controlling for the other variables.

**Table 2: Estimates of Structural Equation Models**

Constructs	Results	Hypotheses
Affective Trust	0.22*	supported
Affective Risk	-0.68***	Supported
Cognitive Trust	0.27*	Supported
Cognitive Risk	n.s.	Not supported
R-Square	0.60	
Chi-square/df = 2.88, GFI=0.85, AGFI=0.79, CFI=0.91, RMSEA=0.097		

**Discussions and Limitations**

This research draws on need-to-belong theory and risk-as-feelings theory to examine the impact of affective trust and affective risk on behavioral intentions in B2C e-commerce, thus extending current models that incorporate cognitive conceptualizations of trust and risk. The current research found that affective trust was a significant predictor of intended use over and above cognitive factors. Cognitive trust was a significant predictor, but cognitive risk was not. This finding that cognitive risk is not significant is completely consistent with Loewenstein et al.’s (2001) paper in which they propose that cognitive risk is epiphenomenal and is a consequence of affective risk which also drives behavior.

This research’s interest in the psychological determinants of adoption behavior is not merely to understand their roles in predicting and explaining adoption behavior, but also largely because of the explanatory and diagnostic insights that may help us understand the various ways in which IT design decisions can influence adoption. Therefore, this study experimentally manipulated ecommerce design artifacts to demonstrate that web design features can influence affective constructs (trust and risk) which in turn influence behavioral intent. The results demonstrated that the success of B2C ecommerce can be improved if web vendors can form emotional bonds with customers, and these customers could experience lower levels of worry, fear or dread.

Current business practices tend to concentrate on improving the navigation structure, the order processing and inventory management. Efforts to build or to strengthen customer vendor relationships often receive less attention than improving the utility functions of the websites. This research shows that online vendors can influence consumers’ behavioral intentions, such as purchase dispositions, willingness to depend on the vendor and willingness to provide private personal information, by adopting website design strategies which include design features such as sincere messages, beneficiary return policy, BBB seal of approval and a package tracking function, etc.

There are several limitations for this research. First, a convenient sample, undergraduate students, was used in the experiment. Although it is arguably appropriate to use a convenient sample, especially in B2C ecommerce context, there are significant differences between “real” customers and college students. Therefore, it is necessary to replicate the experiment with different samples to test the model and instruments. Second, other important extraneous constructs might be omitted from the research model, such as trust propensity or risk propensity. A closer examination of the influence of these constructs could provide a richer understanding of the impact affective risk on trusting intentions. Third, additional conjoint analysis might be needed to further validate the importance of selected design features.

## Future Studies and Conclusions

Future research should further study the impact of design features on cognitive trust and affective trust. One possible solution could be that medical equipment such as MRI machines can be used in experiments. These kinds of machines can capture the responses from which parts of the brain would react when different stimuli are shown on screen. Additional studies can also not only replicate the findings from this study with different types of online vendors. The online store used in this study is basic and the only products are digital cameras. A more sophisticated online store that sells either higher valued items such as refrigerators or more emotionally attached items such as clothing can be adopted. It is possible that the impact of design features such as sincere messages, beneficiary return policy, BBB seal of approval on cognitive trust and affective trust may be stronger for these stores.

Different vendors may need to emphasize separate sets of design features at various phases of business practices. The results indicated that customers' affective risk feelings may have dominant influence on their intentions when they are unfamiliar or have no experience with a web vendor. It is less likely that a customer will purchase from an unknown vendor if the customer has serious negative feelings about the consequences. Therefore, newly established web vendors need to pay special attention to mechanisms or design features such as those examined in this study to reduce these feelings. Carefully worded customer service policies and seals of approval might be useful to calm and to mitigate potential negative emotions. For vendors with which customers have certain experience, their best strategy should be to focus on building customers' feelings of emotional bond besides their trusting beliefs.

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**Appendix**

**Survey Instruments**

<b>Constructs</b>	<b>Items</b>
<b>Affective Trust</b>	I feel attached to this web store.
	I would feel a sense of loss if this store went out of business.
	There is a connection between me and this web store.
	I can go "the extra mile" to remain a customer of this web store.
<b>Cognitive trust</b>	This web store is honest.
	Overall, this web store is trustworthy.
<b>Affective Risk</b>	I feel tense when I am going to purchase from the web store.
	I am concerned about possible privacy violations from this web store.
	I worry about my order if I purchase from this web store.
	I feel uneasy about the quality of the health products offered by this store.
<b>Cognitive Risk</b>	This web store might ship me products that do not function properly.
	I might receive wrong products from this store.
<b>Behavioral Intentions</b>	I can rely on this web store to purchase to purchase my product.
	I trust this web store completely.
	I am very likely to provide the web store with my personal information.
	I intend to purchase the product from this web store.