

# Poster: Trustworthiness and the Perception of Security

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## ABSTRACT

Using survey data from user of the kp.org website, relationships between perceived website trustworthiness and perceived website security were examined. These two factors were highly correlated ( $r=0.782$ ). Ratings of website trustworthiness did not differ by age or gender, but were lower for college graduates than for subjects who had not attended college. While perceived overall usefulness of the kp.org website was not highly correlated with either ratings of website security or website trustworthiness, ratings for trustworthiness and security were slightly higher for frequent users of the kp.org website (10 or more visits in a 6 month period) than for those who used the website less frequently (0 to 4 visits in a 6 month period). As a whole, the data suggests that general brand trust may affect perceptions of website security more than any particular security controls which actually make a website more secure. In addition, anecdotal data from usability testing suggests that brand trust may make users more accepting of security controls which could be seen as intrusive.

## Categories and Subject Descriptors

H.1.2 [Information Systems]: User/Machine Systems—*human factors, software psychology.*

## General Terms

Security, Human Factors

## Keywords

Trust, Security

## 1. INTRODUCTION

Kp.org is the flagship website of Kaiser Permanente, a health maintenance organization with over 8.6 million members. Kp.org services are used frequently by over 3 million members with active, secure accounts, for such things as refilling prescriptions, viewing lab test results, and sending secure e-mail between patients and medical providers. Use of kp.org is highly promoted by Kaiser Permanente, as services provided through kp.org are more efficient and less costly than providing the same services through alternate channels (e.g., filling a prescription online rather than coming into a Kaiser Permanente pharmacy). During recent usability testing, focused on the redesign of kp.org registration and sign on services, many of the subjects indicated a high level of trust in the tested security controls (e.g., use of Knowledge Based Authentication in establishing a new account).

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When asked why they believed the website security was strong, most subjects cited their trust in Kaiser Permanente as an organization to provide a high level of security. From these comments, an analysis of user experience survey data was undertaken to better understand the relationship between trust and perceived security.

## 2. METHODOLOGY

In 2008, 10,000 kp.org users with secure accounts were randomly selected from all secure account holders and invited to participate in an e-mail survey. Kp.org accounts are available to Kaiser members and are a requirement to access protected website capabilities. The response rate was 17% ( $n = 1,702$ ). There were more female than male respondents (female = 57%, male = 43%) and the average age of the sample was 60.2 years. The gender distribution of the sample approximates that of the population of kp.org secure account holders; however, the average age of the sample was approximately 11 years older.

Survey respondents were asked to rate kp.org along nine dimensions: “secure”, “trustworthy”, “accurate”, “reliable”, “relevant”, “innovative”, “informative”, “visually appealing”, and “convenient”. Respondents were also asked to indicate their overall satisfaction with kp.org. The number of secure kp.org sessions initiated by each respondent in the 6 months prior to the survey was obtained from system log data.

## 3. RESULTS

Ratings of all nine descriptive dimensions for kp.org were all relatively positive (Table 1), and were highly correlated with each other. The relationship between perception of security and perception of trustworthiness was the strongest of all the correlations ( $r=0.782$ ).

Table 1. Ratings of kp.org along nine dimensions

Kp.org is...	Mean (1=not at all, 5=extremely)
Secure	4.33
Trustworthy	4.27
Accurate	4.22
Reliable	4.18
Relevant	4.16
Innovative	4.14
Informative	4.09
Visually appealing	3.95
Convenient	3.84

There was not a strong correlation between users who reported overall satisfaction with the website and the dimensions of “trustworthy” or “secure” (Table 2). Other dimensions such as “convenient” ( $r=0.533$ ) and “useful” ( $r=0.502$ ) showed stronger correlations with website satisfaction

**Table 2. Correlation of ratings to satisfied users**

Rating Dimension	r
Convenient	0.533
Useful	0.502
Innovative	0.496
Relevant	0.470
Informative	0.464
Visually appealing	0.430
Trustworthy	0.371
Secure	0.312

“Satisfied” users are those who responded as either satisfied or very satisfied when asked about their overall level of website satisfaction. A high percentage (90.7%) of users fell into this category.

Site utilization (e.g., secure kp.org sessions initiated in the six months prior to survey administration) showed that people who visited the website less frequently had mean “trustworthy” and “secure” ratings that were lower than those who visited kp.org more frequently (Table 3).

**Table 3. Mean ratings by number of secure visits**

	# of Secure Visits	n	Mean
Trustworthy	0 to4	439	4.14
	5 to 9	587	4.29
	10 or more	647	4.35
Secure	0 to4	439	4.19
	5 to 9	587	4.35
	10 or more	647	4.43

Trustworthy:  $F=9.0$ ,  $p<0.001$ ; Secure:  $F=12.30$ ,  $p<0.001$

Mean ratings of both trustworthiness and security did not differ significantly based on either gender or age. However, people with no college experience were more likely to rate kp.org as more “trustworthy” and “secure” than those who graduated from college (Table 4).

**Table 4. Mean ratings by education**

	Education Level	n	Mean
Trustworthy	High School or less	183	4.39
	Some college	585	4.30
	College Graduate	526	4.21
	Post Graduate	385	4.25
Secure	High School or less	183	4.46
	Some college	585	4.39
	College Graduate	526	4.28
	Post Graduate	385	4.28

Trustworthy:  $F=2.90$ ,  $p<0.05$ ; Secure:  $F=4.02$ ,  $p<0.01$

## 4. DISCUSSION

The high correlation ( $r=0.782$ ) between perceptions of security and website trustworthiness is not too surprising, as one might expect users to tightly connect these two concepts. One interpretation of the correlation is that users *trust* the kp.org website because it is *secure*. Another possibility is that overall brand perceptions of Kaiser Permanente as an organization are influencing perceptions of both security and trust. We believe that to some extent both explanations contribute to the findings and are planning a follow-up survey to further explore the relationship between security and trust.

The survey results summarized in Table 2 show that user perceptions of kp.org convenience, usefulness, and other attributes are more closely correlated with overall website satisfaction than dimensions of security and trust. Our interpretation of this finding is not that users don’t value website security/trust (especially for personal health data), but rather that once users reach a threshold level of trust in a website’s security, attributes more closely related to how value is derived from using the website become more important to driving overall satisfaction. This interpretation is to some extent supported by our findings on website usage, which shows only small differences in security and trust ratings based on the frequency of usage.

As noted earlier, we did not find a correlation between perceptions of security and trust, and age or gender; however, there was an inverse relationship between security and trust, and education level. In general, people with more education (e.g., college graduate and beyond) tended to express greater concern about security and trust than those with less education. This result may be explained by the fact that people with more education have greater awareness of the inherent risks of the technology. This risk awareness for educated people may come from several sources such as their schooling, professional exposure, and media exposure to sensational hacker stories. These channels of information on risks would play a smaller role for people with less education.