

Exploring the Impact of Individual Differences on Information Security Awareness

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Background and Purpose

Since the earliest days of computers, practitioners and researchers have acknowledged the importance of end-user behaviors in securing modern personal and organizational information resources. Behavioral information security research has increased in the past 15 years, applying many, if not most, of the existing theories and models of human behavior to the information security domain. While many have tried to identify or develop a dominant behavioral model of information security, there is still no consensus in the field. One thing that is almost universally accepted in this field of research is the importance of information security training to increase end-user awareness of the security threats they face as well as the actions required to mitigate those threats. There is a practical need to be able to consistently measure Information Security Awareness (ISA) pre- and post-training and longitudinally to determine effectiveness and retention of that training. From a theory-building and testing perspective, there is a large gap in our understanding of how ISA is developed, the most critical antecedents of ISA for different security contexts, and how ISA directly and indirectly impacts actual security behaviors and misbehaviors.

Exploring the impact of individual differences on human behaviors is also not a new research topic. However, while many studies published in behavioral security research highlight the many different contextual impacts on security behaviors, there is no consensus on how identified differences (whether organization, cultural, individual, etc.) should be integrated into ISA training. ISA training is still largely built and delivered as one-size-fits-all in practice. Either practitioners are not listening, or our research is not effectively communicating the impact of individual differences on security behaviors and how training should be delivered given those differences.

The purpose of this study is to replicate and extend the Human Aspects of Information Security – Questionnaire (HAIS-Q) in measuring ISA as well as address the following questions related to ISA and individual differences.

- RQ1: Do end-user personality traits predict their information security awareness?
- RQ2a: Does the strongest predictor of ISA, conscientiousness, predict incremental variance over ISA knowledge for ISA attitude?
- RQ2b: Does end-user conscientiousness moderate the relationship between ISA knowledge and ISA

attitude?

- RQ3a: Does end-user conscientiousness predict incremental variance over ISA attitudes for ISA behavioral intent?

- RQ3b: Does end-user conscientiousness moderate the relationship between ISA attitudes and ISA behavioral intent?

- RQ4a: Does the strongest predictor of ISA, conscientiousness, predict incremental variance over ISA knowledge for ISA behavioral intent?

- RQ4b: Does conscientiousness moderate the relationship between ISA knowledge and ISA behavioral intent?

Design/methodology/approach

Prior HAIS-Q studies centered on Australian university students and professionals. McCormac et al. (2017) surveyed 505 working professionals using the HAIS-Q and the Big Five Indicators (BFI) scale from John & Srivastava (1999) to test individual differences and ISA. In order to validate the HAIS-Q and test the results of the findings from McCormac et al. (2017) in different demographic groups, 425 surveys were administered to two different populations – students at a small midwestern US university (358) and using Amazon’s MTurk (67). Additionally, we use the revised BFI2 scale from Soto & John (2017) to test whether the findings of McCormac et al. (2017) were supported using the substantially-updated personality scales.

Findings

This study confirmed some of the findings of McCormac et al. (2017) but also identified some differences in terms of personality indicators that significantly impact ISA. For example, McCormac et al. (2017) determined that Extraversion was not a significant contributor to ISA, but our data indicated a significant, negative correlation – the more extraverted the end-user, the lower their overall ISA. The differences between our study and McCormac et al. (2017) could be attributed to demographic differences and/or the use of the revised BFI2 instrument. Additionally, our analysis extends the findings of McCormac et al. (2017) in that we analyzed and identified the moderating effect of conscientiousness on the KAB model: information security knowledge to attitude, attitude to behavioral intent, and knowledge to behavioral intent. We found that conscientiousness reduces the strength of the relationship between knowledge and attitude. In contrast, conscientiousness strengthens the between attitude and behavioral intent.

Research limitations/implications (if applicable)

The combined HAIS-Q and BFI2 used in this study is a survey instrument; the use of self-reported measures and the validity of self-reports has been and will continued to be criticized and debated in academic research. However, the intent of this study is more exploratory in nature and will be used in future experimental studies to test the relationship of ISA and individual differences with actual security behavior. The main theoretical contribution of this work is to further validate and evolve the HAIS-Q as a valid and reliable measure of ISA in both the workplace and for end-users (in the absence of formal ISPs). Additionally, this study is the first to use the BFI2 in behavioral information security research; based upon the differences in findings for this and McCormac et al. (2017), there is reason to evaluate past security-related research that relied upon the original BFI and update findings with the new personality measures.

Practical implications (if applicable)

The primary contribution of this paper is to help identify the individual differences in end-user personalities that could affect their overall ISA and actual security behaviors. This study provides empirical evidence that, even within a relatively homogenous sample of US college students at a single university, the same static ISA training is affected by individual differences, providing further evidence that one-size-fits-all security training is not equally as effective across personality types.

Originality/value

To date, the HAIS-Q has not been validated in a non-Australian sample, and this study does that with two different demographic groups. Additionally, this study uses the BFI2 instrument. Finally, this paper appears to be the first that explores the moderating effect for personality indicators and ISA knowledge, attitude and behavioral intent.